Better Homes and Gardens®

WOOD

THE MAGAZINE FOR HOME WOODWORKERS

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AUGUST 1987•ISSUE NO. 18
Display Until August 18

LEG-RAIL JOINERY
Two techniques for building sturdy tables and chairs

WOODWORKERS' STANDARDS
Learn to read plans and drawings like a pro

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Fast, convenient planing in a small package

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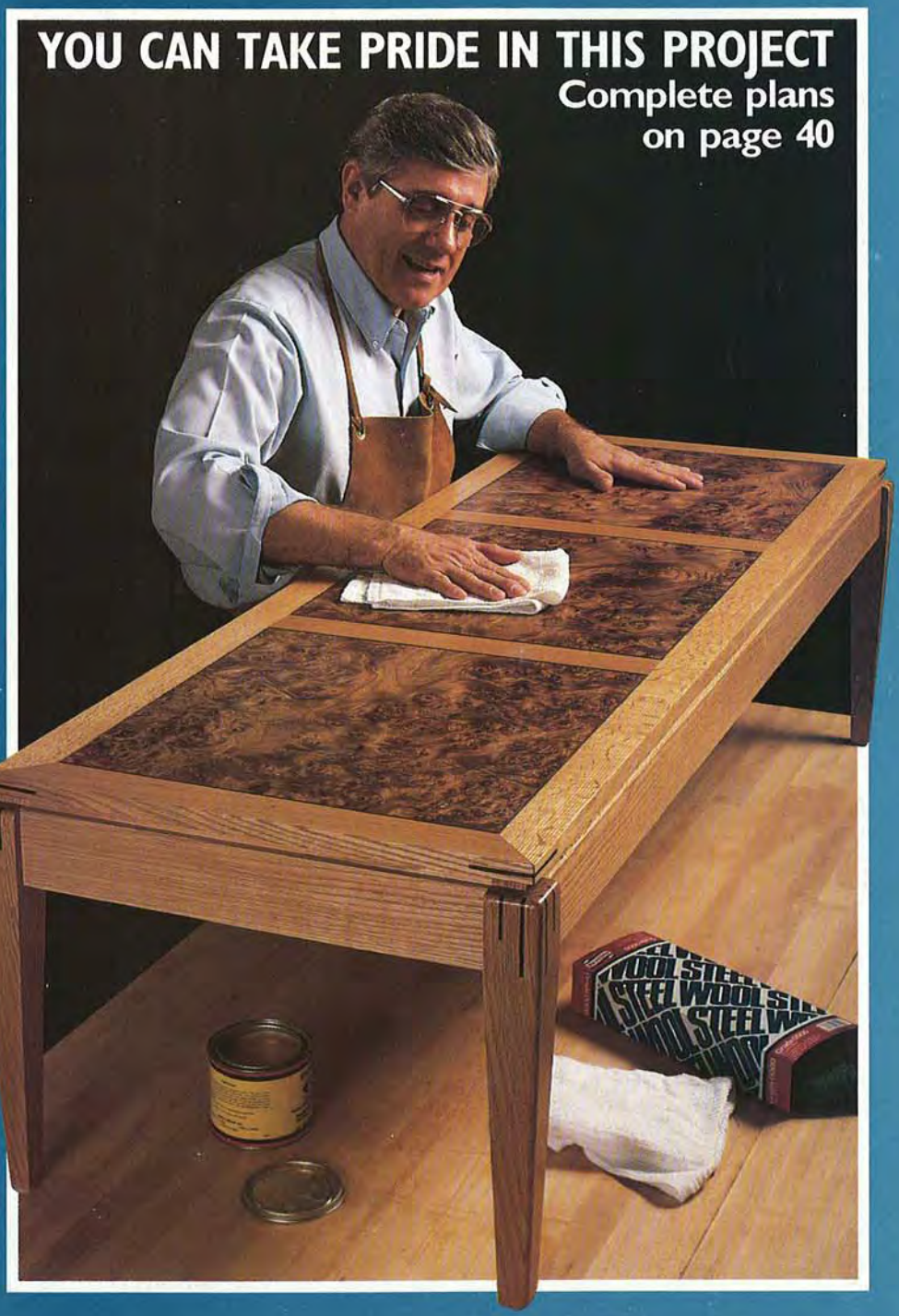
Sailboat
Taper jig
Paperweights



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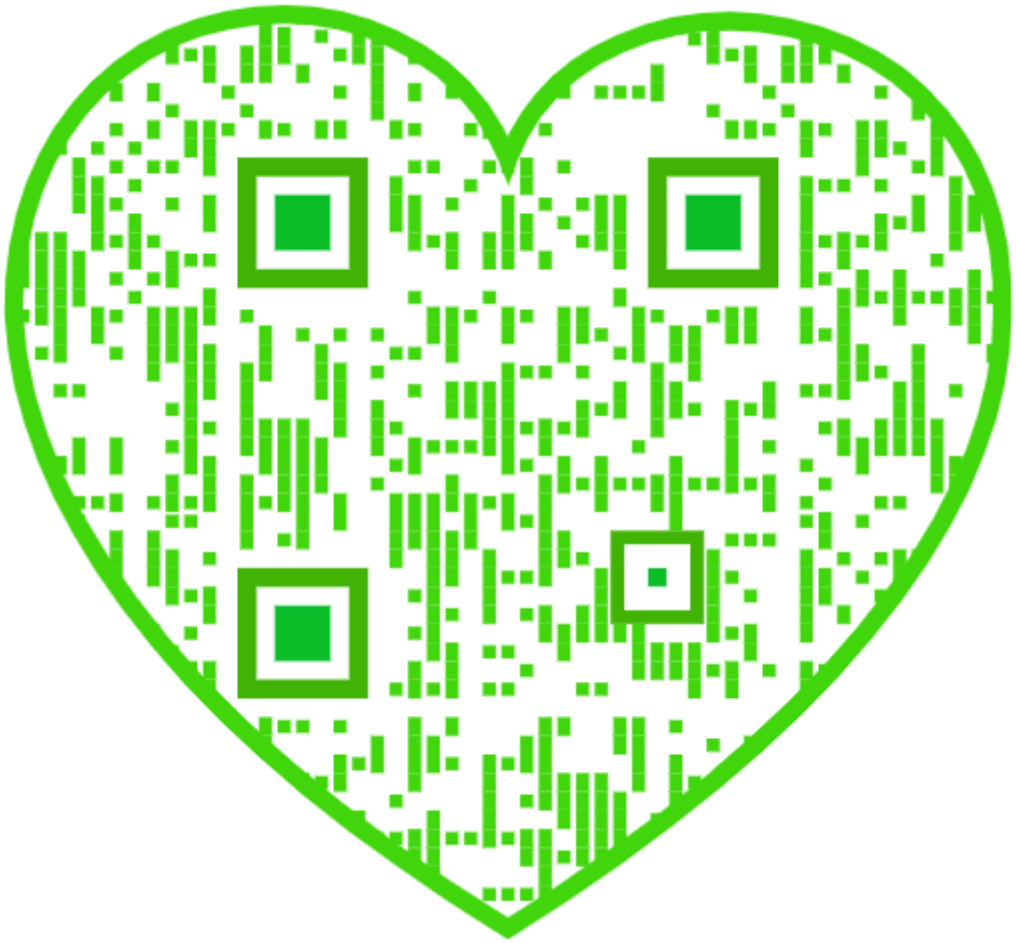

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35-617	10"x50 ATB&R	$79.65	**$42.50**
35-657	12"x60 ATB&R*	$83.25	**$60.00**
Miter Box			
35-619	10"x60 TC&F	$95.80	**$45.00**
Sawbuck® Frame & Trim Saw			
35-593	8"x48 TC&F	$83.80	**$45.00**
Special Purpose			
35-611	10"x18 FT (Rip)	$67.80	**$39.50**
35-614	10"x48 ATB (Ply & Comp)	$89.20	**$42.50**
35-624	10"x80 TC&F (Laminates)	$125.10	**$75.00**

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		List	Sale
Set of 3 Blades		$272.77	$165.50
LM72M010	10 x 24 Flat	70.69	48.25
LU84M011	10 x 50 Comb	81.22	49.75
LU85M010	10 x 80 ATB	120.86	81.50

DADO

Freud Carbide Tipped Dado Heads produce a smooth and accurate groove when used running with the grain or across the grain. The standard dado cuts a maximum width of 13/16 inch. All blades and chippers are carbide tipped and sharpened to give you a long cutting life. The set contains 2 outside blades of 1/8" kerf, one 1/16" chipper, two 1/8" chippers and one 1/4" chipper.

		List	Sale
DS306	6" x 18 Dado Set	$189.00	$129.50
DS308	8" x 18 Dado Set	$198.00	$134.50

94-100

Produce your own cabinet doors with this 5-piece router bit set at a fraction of the cost of shaper heads!!

These bits are individually balanced and designed to be used with a 1/2" table mounted router.

The bit profiles are: rail and stile, raised panel, door lip, and glue joint. All bits are precision sharpened for a long cutting life.

		List	Sale
94-100	5 Piece Router Door System	$299.00	$235.90

EC-900

Produce professional quality cabinet doors with this 5 piece set of cutter heads designed for your 3/4" - 1/2" spindle shaper. These heads are sharpened with a 600 grit diamond wheel for an extremely sharp edge. One half inch bushings standard.

The shaper head profiles are: Rail & Stile, raised panel, door lip, and glue joint.

		List	Sale
EC-900	5 piece Shaper Set	$569.00	$429.90

90-100

This 15 piece router bit set offers you a great variety of useful bits from "V" grooving and flush trimming to chamfering and dovetailing. All bits are solid carbide or carbide tipped and are ground to a razor sharp edge. Profile bits have a shear face for an extremely smooth finish. All bits have a 1/4" shank.

		List	Sale
90-100	15 pc. Router Bit Set	$299.00	$199.90

FB-100

These Forstner bits will produce a flat bottom hole and bore any arc of a circle at any angle thus allowing you to make pocket holes. A special heat treated steel is used in their production to assure long lasting edges.

The 16 piece set includes bits from 1/4" to 2 1/8" inclusive in 1/8" increments.

		List	Sale
FB-100	16 pc. Forstner Bit Set	$269.00	$209.90

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These hand saws are made in Sheffield, England out of their finest steel to give you high performance and durability. These high quality blades are flexible but will always return to true.

The collection of 5 saws (rip, panel, tenon, dovetail, gent's) will meet all of your hand saw needs. They are precision balanced, thus letting the saw work with you. The lacquered English red beech handles are designed to make your precision sawing comfortable.

		List	Sale
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PS022	22" x 10 points	22.83	21.50
TS012	12" x 15 points	29.16	27.40
DS008	8" x 20 points	25.58	24.00
GS006	6" x 15 points	10.49	9.90

DB-050

This 50 piece set consists of: A) 25 high speed steel bits (1/16" - 1/2" in 1/64" increments) B) 4 high speed steel bits for sheet metal (1/4, 3/16, 1/8, 3/32) C) 6 chrome vanadium steel brad point bits for use in wood (1/8, 5/32, 3/16, 1/4, 5/16, 3/8) D) 6 carbide tipped masonry bits with hex shanks (5/32, 3/16, 7/32, 1/4, 5/16, 3/8) E) 1 center punch, 1 Allen key and 6 depth stops.

These bits fit any stationary or portable drill using 3/8" or larger chuck.

		List	Sale
DB-050	50 Piece Drill Bit Set	$ 99.00	$ 74.00

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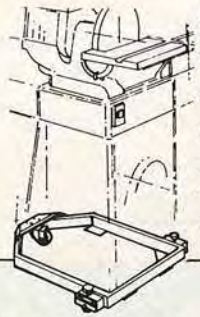

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Better Homes and Gardens®

WOOD

This issue's cover wood grain: Mineral-streaked aspen

AUGUST 1987 **ISSUE NO. 18**

WOOD PROFILE

ASPEN — ABUNDANT, BLONDE, AND SPLINTER FREE 29

Beavers love it, and so will you when you try this easy-to-work, pale-grained softwood in your shop.

CRAFTSMAN CLOSE-UP

"THE WORLD'S GREATEST SHOP TEACHER" 30

Meet Carmen Schifano, a teacher whose students rate him an A+. He teaches woodworking skills — and a whole lot more.

SHOP-TESTED TECHNIQUES

LEG-RAIL JOINERY 34

Planning a table or chair project? We show you, step-by-step, how to do two time-tested joinery methods for leg-rail construction. Both will help keep your projects standing strong and sturdy for years to come.

NOW YOU CAN BUILD IT

BURL-TOPPED COFFEE TABLE 40

Carpathian elm burl veneer adds an exquisite finishing touch to our walnut-accented, and rock-solid oak table that's supported by — you guessed it — a mortise and notched tenon framework.

"TRUE-CUT" TAPER JIG 45

Ever wonder how to cut those perfectly tapered table legs? We've got the answer! Our easy-to-make taper jig will help you fashion them safely and error-free on your table saw.

WOODWORKERS' STANDARDS: DRAWINGS & PLANS 46

Deciphering blueprints and project plans can be tricky. This article will clear up any questions you may have.

COLLECTING TOOLS 50

Start a fun, fascinating, even profitable hobby! Some collectors love the challenge of the hunt. Others find satisfaction in helping preserve a bit of history or a valued piece. If you're thinking of starting a collection, these tips can help you get your collecting efforts started off on the right foot.

AMERICA'S CUP — OUR RENDITION OF A 12-METER RACING YACHT 54

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ARCHED-TOP SHELVING SYSTEM 58

If you're looking for attractive, efficient wall storage, our modular system may be the perfect answer. You can build one, two, three, or four of the 34"-wide units, to fit neatly into available wall space.

THE EXECUTIVE PAPERWEIGHT 64

Everyone knows a "person who has everything". But we'll bet he or she doesn't have one of these wood beauties. They make an unusual gift — and they're yours for the turning!

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LACQUER: THE CHOICE OF MANY PROFESSIONALS MAY BE PERFECT FOR YOU 66

Learn all about this super fast-drying wood finish — its advantages over other finishes, tips on spraying and brush-applying it, and our shop-tested 8-step finishing system.

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For sheer speed and convenience, you can't beat these hardworking, portable planers. To find out more, read our 6-page report.

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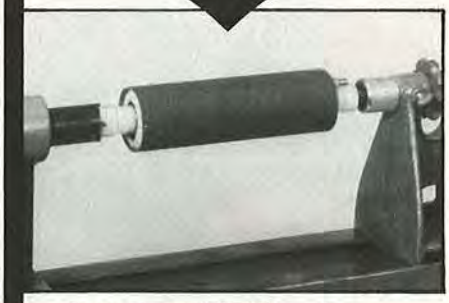

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ON THE FINE ART OF BUYING A BAND SAW... THEN INFORMING YOUR SPOUSE

WHAT BILL WAS ENVISIONING

"You big bloke! I sent you to London with our cow, and you came back with a band saw! How could you?"

A couple of months ago, I had the good fortune to spend a week in England on business. It was a marvelous experience, let me tell you. I attended a woodworking show in North London, spent some time talking shop with some British woodworking friends of mine, and toured three woodworking tool manufacturing facilities — Footprint Tools, Record-Ridgeway Tools Ltd., and Robert Sorby Ltd. It's a trip I'll long remember.

While at the Practical Woodworking Exhibition, I met Bill Bass in person for the first time. Bill had come from Rugby, as he does each year, to attend the exhibition, and his chief objective this year, he told me, was to purchase a better-quality band saw than the one he currently had.

It seems that Bill had one teeny-tiny problem, though. He had plenty of pound notes in his wallet alright, but he "forgot" to tell Jill, his wife, about his intended purchase. (I've had memory lapses like that myself on occasion.)

THE REALITY OF THE SITUATION

We're not sure what Bill said to Jill to make her so happy, but a lot of us would like to know.

After carefully inspecting several saws, Bill finally settled on a DeWalt, and the vendor loaded the tool into Bill's car for the trip home. When I left Bill that night, I asked him to be sure to write and let me know how he came out when he showed Jill his new toy. He was worried, folks!

Fortunately, Jill is an understanding woman, and Bill, after a few anxious hours in his car on the way back to Rugby, reports back that "All's well, and she still loves me!"

Print this article

Larry Clayton

Vision Breakthrough

When I put on the pair of glasses what I saw I could not believe. Nor will you.

They look like sunglasses.

By Joseph Sugarman

I am about to tell you a true story. If you believe me, you will be well rewarded. If you don't believe me, I will make it worth your while to change your mind. Let me explain.

Len is a friend of mine who knows good products. One day he called excited about a pair of sunglasses he owned. "It's so incredible," he said, "when you first look through a pair, you won't believe it."

"What will I see?" I asked. "What could be so incredible?"

Len continued, "When you put on these glasses, your vision improves. Objects appear sharper, more defined. Everything takes on an enhanced 3-D effect. And it's not my imagination. I just want you to see for yourself."

COULDN'T BELIEVE EYES

When I received the sunglasses and put them on I couldn't believe my eyes. I kept taking them off and putting them on to see if indeed what I was seeing was indeed actually sharper or if my imagination was playing tricks on me. But my vision improved. It was obvious. I kept putting on my $100 pair of sunglasses and comparing them. They didn't compare. I was very impressed. Everything appeared sharper, more defined and indeed had a greater three dimensional look to it. But what did this product do that made my vision so much better? I found out.

The sunglasses (called BluBlockers) filter out the ultraviolet and blue spectrum light waves from the sun. You've often heard the color blue used for expressions of bad moods such as "blue Monday" or "I have the blues." Apparently, the color blue, for centuries, has been considered a rather depressing color.

For eyesight, blue is not a good color too. There are several reasons. First, the blue rays have one of the shortest wavelengths in the visible spectrum (red is the longest). As a result, the color blue will focus slightly in front of the retina which is the "focusing screen" in your eye. By blocking the blue from the sunlight through a special filtration process, and only letting those rays through that indeed focus clearly on the retina, objects appear to be sharper and clearer.

The second reason is even more impressive. It is harmful to have ultra-violet rays fall on our eyes. Recognized as bad for skin, UV light is worse for eyes and is believed to play a role in many of today's eye diseases. In addition, people with contact lenses are at greater risk because contacts tend to magnify the light thus increasing the sun's harmful effects.

SUNGLASS DANGER

Finally, by eliminating the blue and UV light during the day, your night vision improves. The purple pigment in your eye, called Rhodopsin, is affected by blue and ultraviolet light and the eyes can take hours to recover from the damage.

But what really surprised me was the danger in conventional sunglasses. Our pupils close in bright light to limit the light entering the eye and open wider at night like the lens of an automatic camera. So when we put on sunglasses, although we reduce the amount of light that enters our eyes, our pupils open wider and we allow more of the harmful blue and ultraviolet light into our eyes.

DON'T BE CONFUSED

I'm often asked by people who read this, "Do those Blu-Blockers really work?" They really do and please give me the opportunity to prove it. I guarantee each pair of BluBlockers to perform exactly as I described.

BluBlocker sunglasses use ophthalmic-quality CR-39 lenses with a hard anti-scratch coating. Over 85 percent of all doctors' prescriptions are now filled with CR-39. No shortcuts were taken.

The black, light-weight anodized aluminum frame is one of the most comfortable I have ever worn and compares with many of the $200 pairs you can buy from France or Italy.

The weakest link in any pair of glasses is the hinge. So there's a precision two-way tension hinge that not only bends when you close the pair, but is spring-loaded to bend outward too. You get a completely flexible frame that will comfortably contour to any size face.

There are also two other models. One is a clip-on pair that weighs less than one ounce and fits over prescription lenses and the second is a precision-molded plastic frame that looks identical to the aluminum model but without the tension hinge. All models include a padded carrying case and a one-year limited warranty.

I urge you to order a pair and experience your improved vision. Then take your old sunglasses and compare them to the BluBlocker sunglasses. See how much clearer and sharper objects appear with the BluBlocker pair. And see if your night vision doesn't improve as a direct result. If you don't see a dramatic difference in your vision—one so noticeable that you can tell immediately, then send them back anytime within 30 days and I will send you a prompt and courteous refund.

DRAMATIC DIFFERENCE

But from what I've personally witnessed, once you wear a pair, there will be no way you'll want to return it.

Pilots, golfers, hunters, athletes and anyone who spends a great deal of time in the sun, who drives a car or who just wants to protect their vision—all will find BluBlocker sunglasses indispensable.

Our eyes are very important to us. Protect them and at the same time improve your vision with the most incredible breakthrough in sunglasses since they were first introduced. Order a pair or two at no obligation, today.

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PROFESSIONAL POWER TOOLS

$52 $129

MOD#	DESCRIPTION	Sell
100	7/8 H.P. Router	92
126	Porta Plane	169
310	Laminate Trimmer	129
312	Offset Lam. Trimr	134
330	Speed Bloc Sander	52
314	4 1/2" Trim Saw	124
361	3x24 Belt Sander	174
363	4x24 Belt Sander	189
504	3x24 Belt Sander	335
505	H D Finish Sander	109
518	3 HP 5 Spd Router	335
536	1 1/2 HP H D Router	195
666	3/8" H.D VSR Drill	117
690	1 1/2 H P Router	129
7514	1/2" VSR Drill	119
7533	Adj. Clutch Driver	149
7548	VS Jig Saw w/case	139
9100	Classic (100) Router	119
9118	Porta Plane Kit	189
9652	Verse Plane Kit	295
59381	Hinge Templ Kit	149
59839	Hinge Templ Acc. Kit	89
304	7" Prof. Disc Sander	129
305	7" Prof. Polisher	129
315-1	7 1/4" Circ Saw	124
43263	Carbide Cutter for 126 or 9118 Planes	49

Emglo Compressors

3/4 H.P.	115 Volt	125 PSI
AM39-HC2	1.5Gal.Single Tank	259
AM39-HC4	3.8 Gal.Twin Tank	279
AM39-HC4V	3.8 Gal.Twin Tank	279
1.5 H.P.	115 Volt	125 PSI
AM77-HC2	1.5Gal.Single Tank	275
AM77-HC4	3.8 Gal.Twin Tank	299
AM77-HC4V	3.8 Gal.Twin Tank	299

Hand Carry - 41 to 54 Pounds
All Models come with Pr. switch, on/off sw. pressure guage, tank drain and regulator/shutoff valve.

RYOBI POWER TOOLS

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MOD #		
AP10	10" Surface Planer	345
E3800	0-4000 Drywall Dr.	79
E3810	0-2500 Drywall Dr.	79
JSE60	Jig Saw Var Spd	99
RJ100VK	VS Recipro Saw	99
S500A	Block Sander	37
SP180	7" Sander Polisher	109
TR30U	Laminate Trimmer	79
TS251U	10" Miter Saw	157
TS380	14" Miter Saw	339
W200S	16 1/4" Beam Saw	319
RA200	8" Portable Rad Arm Saw	247
BD101R	3/8" Cordl Drill	47
R501	Plunge Router	169
B7100	3x24 Belt Sander	129
AP10	Planer Blades	25

$345

Makita Power Tools

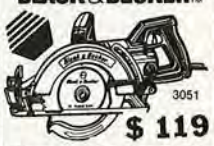
#6012HDW $105

Carbide Planer Blade for MAKITA 1100 & 1900 29

Makita Battery Pack Special
9 VOLT 28
7 2 VOLT 26

1100	3 1/4" Planer w/case	179
1900BW	3 1/4" Planer Kit	109
2708	8 1/4" Table Saw	209
3601B	1 3/8" HP Router	118
3612BR	3HP Plunge Router	189
4200N	4 3/8" Trim Saw	109
5081DW	3 3/8" Cordless Saw	109
5402A	16 6/16" Beam Saw	319
5600DW	Cordl. Circ Saw 6 1/4"	155
6012HDW	3/8" Cordl Scrudrill	105
6301LR	1/2" D Handle Drill	109
6510Lvr	3/8" VSR Drill	76
6801DBV	0-4000 Drywall Scrugun	89
6905B	1/2" Impact Wrench	149
6906	3/4" Impact Wrench	319
8419B2W	3/4" Hammer Drill	159
9030	1" Belt Sander	139
9207SPB	7" Polisher 2 Spd	135
9501BK	4" Mini Grinder	65
9820-2	Blade Sharpener	169
9924B	3x24" Belt Sander	129
B04550	Block Sander w/Bag	49
DP4700	1/2" VSR Drill	107
HP1020	3/8" Hammer Drill	69
HP1030W	3/8" Hmr Drill/case	99
JR3000V	Var Spd Recipro Saw	119

BLACK & DECKER



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3310	1 1/2 HP Router	119
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1980	3/8" Cordl drill w/Clutch	99
3051	7 1/4 Worm Dr Saw	119
3103	2 Spd Cutsaw	89
4010-10	Palm Sander	39
1703	10" Miter Saw	159
6513-09	1/2" Dr. Impact Wrench	119
98003	Cordl Drill Battery	38

DELTA

Delta Carbide
Blades and Cutters

35-625	10"x80T TC&F	76
35-623	10"x80T ATB	69
35-677	14"x108T ATB	89
35-647	12"x72T ATB	79
35-626	10"x60T ATB	49
35-560	8" Carb Dado Set	99

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43-921	Cabinet set	165
43-922	Cabinet set	169

Milwaukee

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6511 2 Spd $119

0228-1	3/8" VSR Drill	79
0222-1	3/8" VSR Drill	98
0234-1	1/2" VSR Drill	105
0566-1	Drain Cleaner	179
1007-1	1/2" Drill SC	148
1250-1	1/2" Drill	148
1610-1	1/2" Spade Hndl Drill	139
1630-1	1/2" Compact Drill	148
1670-1	1/2" Hole Hawg	195
3002-1	Rt angl Electricians Drill	179
3107-1	Rt angl Drill Kit	199
3300-1	Rt angl Magnum Drl	195
5347	1½" Rotary Hmr	399
5399	1/2" Hammer Drill	179
5455	7"/9" Polisher	136
6012	Orbital Sander	118
6095	9" Sander/Grinder	104
6215	Chain Saw	143
6377	7 1/4" worm Drive Saw	169
6511	2 Spd Sawzall, case	119
6539	Cordless Screwdriver	69
6543-1	0-1000 rpm Screwdriver	149
8975	Heat Gun	59

freud Carbide

Blades and Cutters

LM72M010	10x24T RIP	34
LU73M010	10x60T ATB	34
LU82M010	10x60T Tr Chip	38
LU84M011	10x50T Combo	36
LU84M012	12x60T Combo	69
DS308	8" Dado Set	109
FB100	16 Pc Forstner Bit Set	138
DB050	50 Piece Drill Bit Set	59
90-100	15Pc Router Bit Set	139

$145

94-100	5Pc Router Bit Set	145
99-210 thru 99-213	Raised panel Router bit each	58
SC001	Blade Stabilizer 5/8" bore	17
TT108	8Pc Lathe Turning Set	55
EC260	3/4 Stile-Rail Shpr Bit	155
EC090	Complete Cabinet Set	166
EC091	Cove and Bead Set	166
EC900	Shaper Door System Set	265
99 034	Lock Miter Router Bit	59
99 032	Wedge tongue rtr bit	48
99 033	Wedge groove rtr bit	48
99 260	Ogee stile & rail rtr bit	79
99 263	cove-bead stile-rail bit	79
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T36-50	1/2" Crown Stapler	282
T35-8	1" Crown Roofing Stplr	222
T35-40	16 Ga Brads 1"-1 3/4"	282
T31-1	5/8"-1" Brads	129

Hitachi Power Tools

D10V	3/8" VSR Drill	69
D13	1/2" Spade Hndl Drill	99
DRC10	3/8" Cordl Scrudrill	79
TR6	Laminate Trimmer	83
TR12	3HP Router	169
C7SA	7 1/4" Circular Saw	65
W6VA	0-2500 Screwdriver	79
CR10V	Var Spd Recipro Saw	114
C8DA	8 1/4" Cordl Circ Saw	124
DH38YA	1 1/2" Roto Hammer	299
C10FA	10" Miter Saw	269

$74

Bosch Power Tools

1581VS	Orbital Action Jig Saw	124
11202B	1 1/2" Roto Hammer	349
11203B	1 1/2" Roto Hammer	349
1601	1 HP Router	89
1604	1 3/4 HP Router	119
3230	Jig Saw	49
11305	30lb Demo Hammer	595
1608T	Tilt Base Lam. Tr'mr	89
1609	Offset Laminate Tr'mr	115
1609K	Lam Tr'mr Inst. Kit	165
1651	7 1/4" Circ Saw	89

$124
Model 1581VS

Skil Tools

77	7 1/4" Worm Dr Saw	134
471	1/2" Impact Wrench	139
492	VS Jig Saw	49
542	Spade Handle Drill	109
551	5 1/2" Circular Saw	79
597	3/8" VSR Drill	59
598	1/2" VSR Drill	69
7565	Palm Sander	39
2016-2	3/8" cordl vsr Drill	95
1400	4x21 3/4" Belt Sndr	135

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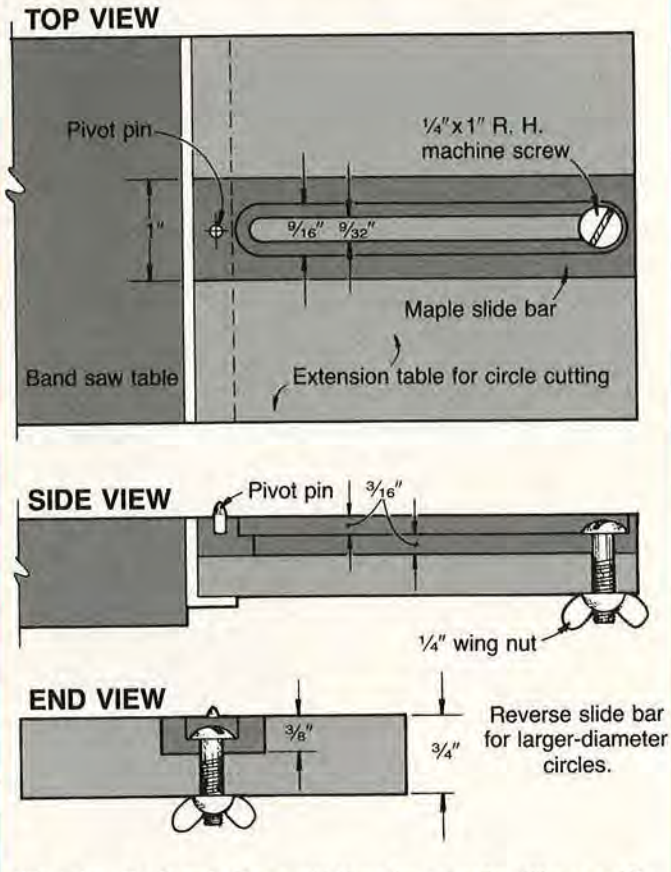
TALKING BACK

We welcome comments, criticism, suggestions ...even an occasional compliment. The volume of mail we receive makes it impossible to answer every letter, but we promise to do our best. Send your correspondence to: Letters Editor, Better Homes and Gardens® WOOD Magazine, Locust at 17th, Des Moines, IA 50336.

NIFTY PIVOT FOR CUTTING CIRCLES

I enjoyed the article "Cutting Curves — And Much More" in your February, 1987 issue (p. 42). In band sawing technique #4 (cutting circles with help of an extension table), you drove a small nail into the extension table top to make a pivot pin. As a refinement, I've added an adjustable sliding bar. This allows me to position the pivot pin where I want it, without having to drill a new hole for each new radius. To use it I simply loosen the wing nut, then slide the bar in or out to position the pin at the correct radius from the saw blade, and then tighten the wing nut. To cut larger circles I simply reverse the slide bar in the slot.

— Richard Fitch, Wellsville, New York



Thanks, Richard. Your sliding bar looks like a nifty, and not-too-difficult-to-make, addition to the band saw extension table top. The reversible slide bar should make it extra helpful for anyone who cuts a lot of different-sized circles. We'll be modifying our extension table, too.

Continued on page 12

The Difference in Value!

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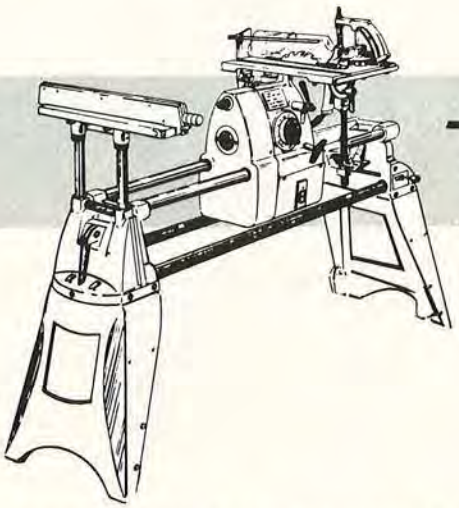
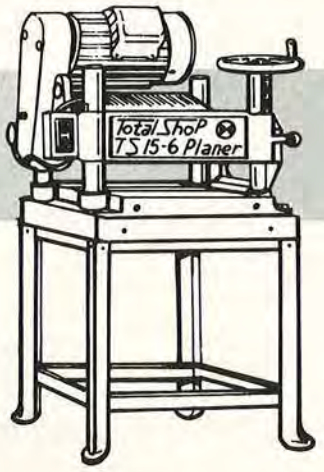


Total Shop®



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	#07	5/32" R	5/32"	1¼"	15/32"	18.00
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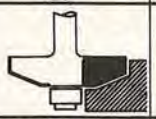
	#10	1/4" (KERF) SLOT CUTTER		1¼"	1/4"	14.00
	#12	45° CHAMFER	45° Angle	1½"	5/8"	15.00
	#15	RAISED PANEL	20° Angle	1-5/8"	1/2"	25.00
	#35	1/4" V Groove 90°		1/4"	1/4"	8.00
	#36	3/8" V Groove 90°		3/8"	3/8"	9.00
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	#17	1/2" Dovetail 14°		1/2"	1/2"	8.50
	#18	3/4" Dovetail 14°		3/4"	7/8"	10.50
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	#24	1/4" Straight Bit		1/4"	3/4"	7.00
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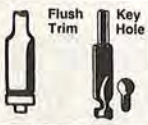
	#26	3/8" Straight Bit		3/8"	1"	7.00
	#27	1/2" Straight Bit		1/2"	1"	7.00
	#28	3/4" Straight Bit		3/4"	1"	10.50
	#13	1/2" FLUSH TRIM		1/2"	1"	8.50
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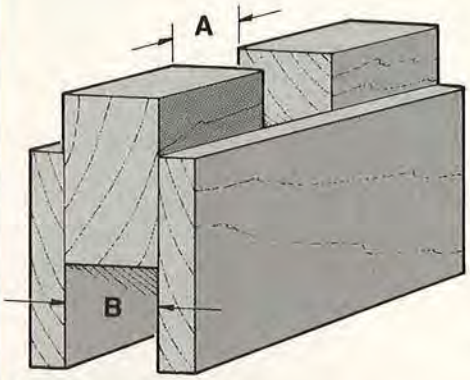
TALKING BACK

Continued from page 10

SADDLES FOR YOUR HORSES

In one of your shop tips (April, 1987, p. 16), you showed using bar clamps on notched wooden horses. Rather than cut into the tops of my horses, I made four saddle-type jigs out of scrap wood. I just slip them over the beam of the horse and position them anywhere I want to support the bar clamps.

— Harry Krochelski, Milwaukee, Wis.



A — Notch wide enough to accept clamps

B — Same width as beam of sawhorse

A BETTER WAY TO SIZE AN OCTAGON

I'd like to suggest an easier way of solving the octagon mirror problem than the one another reader gave ("Talking Back," April, 1987, p. 8). The length of the sides of regular polygons (equal sides) is a function of the radius of both inscribed and circumscribed circles.

For an octagon mirror, the inscribed radius will be applicable, and equals A divided by 2 (17½" ÷ 2 = 8¾"). The length of the Y side will be 7¼" (8¾" ÷ 1.2071 = 7¼").

So, the length of the long side, B, would be 7¼" plus the difference in width and length, or 7¼" plus 5½" for a total of 12¾".

The mathematical ratios between areas, lengths of sides, and radii of many polygons can be found in books of mathematical tables called "mensuration" formulas. These predefined ratios can also be used to solve problems opposite to the one given. For example, what would be the longest octagon (across parallel sides) that could be constructed with boards 16" long? (Answer: 16"x1.2071x2 = 38 ⅝".)

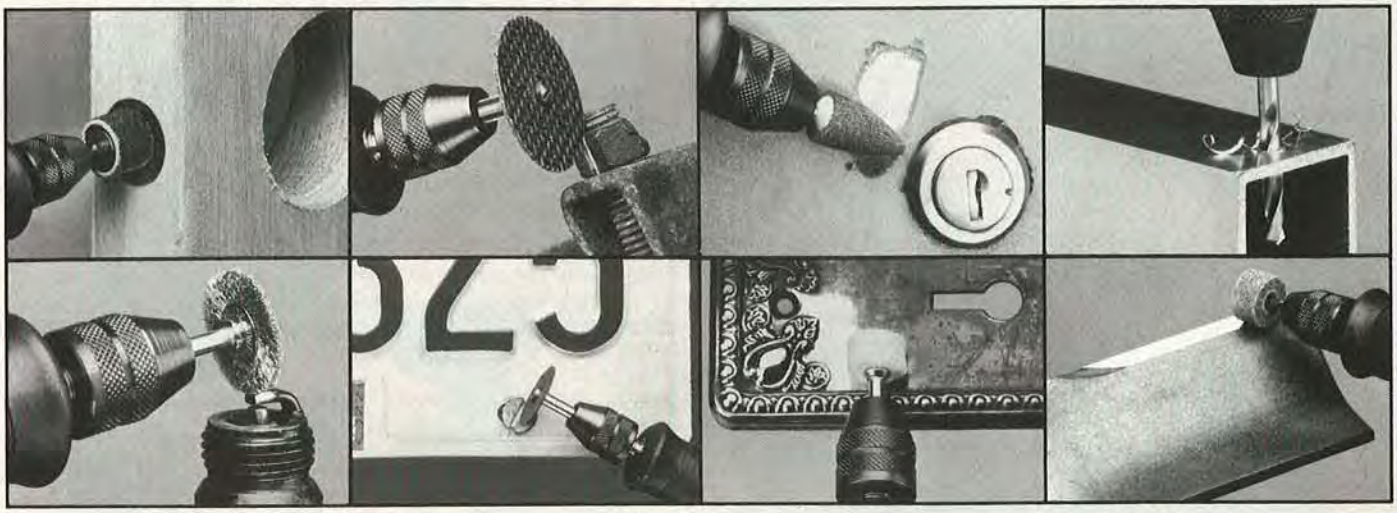
— Richard Bankes, Cincinnati, Ohio

A number of readers wrote suggesting alternate ways to calculate the lengths of sides of an octagon. Most of the solutions solved the problem but resulted in slightly different-shaped octagons.

Also, several readers thought the number 3.4142135 used by Mr. Van Bibber in his solution was a mistake for the value of pi (3.1415927). Actually, and as reader Bert Colwell of Ft. Walton Beach, Florida, pointed out in his letter, you calculate this value using the Pythagorean theorem.

Continued on page 15

THE TASK MASTER.



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TALKING BACK

Continued from page 12

BODARK BY ANY OTHER NAME

Being a homegrown East Texan, I survived many "horse apple" fights, the fruit of the female Bodark tree. But I always thought you spelled the name "Bois d'arc".

— K. G. Smith, Tyler, Texas

Osage orange (Maclura pomifera), like so many trees and plants, answers to a variety of common names, depending on where it's growing. You'll find bodark, bois d'arc, bowwood — even ironwood — accepted common names in different regions.

By the way, here in Iowa, we also call osage orange "hedge apple."

PLAY IT SAFE — WEAR GLOVES

The majority of water-soluble aniline dyes (Aniline Dyes, April 1987, p. 48) are azo dyes that exhibit varying degrees of toxicity. A number of them are potentially carcinogenic. New azo dyes appear on the market from time to time, and the toxicological properties of many have not yet been defined. Also, many once-popular azo dyes have been removed from the market because they were carcinogenic.

Good practice, I believe, requires viewing all aniline dyes as potential health hazards. As a precaution, one *should not* apply the solutions bare-handed.

— William T. Roubal, Professor & Chemist, Seattle, Wash.

LEFTIES IN A RIGHT-HANDED WORLD

I'm a left-hander and have experienced some of the problems you mentioned in the April 1987 "Talking Shop" column (p. 104). I have found worm-drive circular saws to be much more comfortable and "natural" to use with the blade on the left side.

— David Feinberg, Rancho Palos Verdes, Calif.

As a woodworker, I have been using my left hand for years to drive screws, switching power tools on and off, and operating jointers and other tools, with little inconvenience. As a matter of fact, I've found several advantages for the southpaw. With little difficulty, I can drive screws with either hand.

— Bruce McCreary, Richmond, Va.

The WOOD *roster currently lists four lefties. Each has encountered, and resolved in one way or other, the problems of handling tools designed primarily for right-handers. Granted, adapting to a right-handed tool is not always difficult. But we dislike having to use tools that are uncomfortable or hard to use simply because they were designed for right-handed people, especially if the design happens to compromise our safety.*

Fortunately, some tool manufacturers are starting to design their tools to make them easier and safer for "southpaws" to use.

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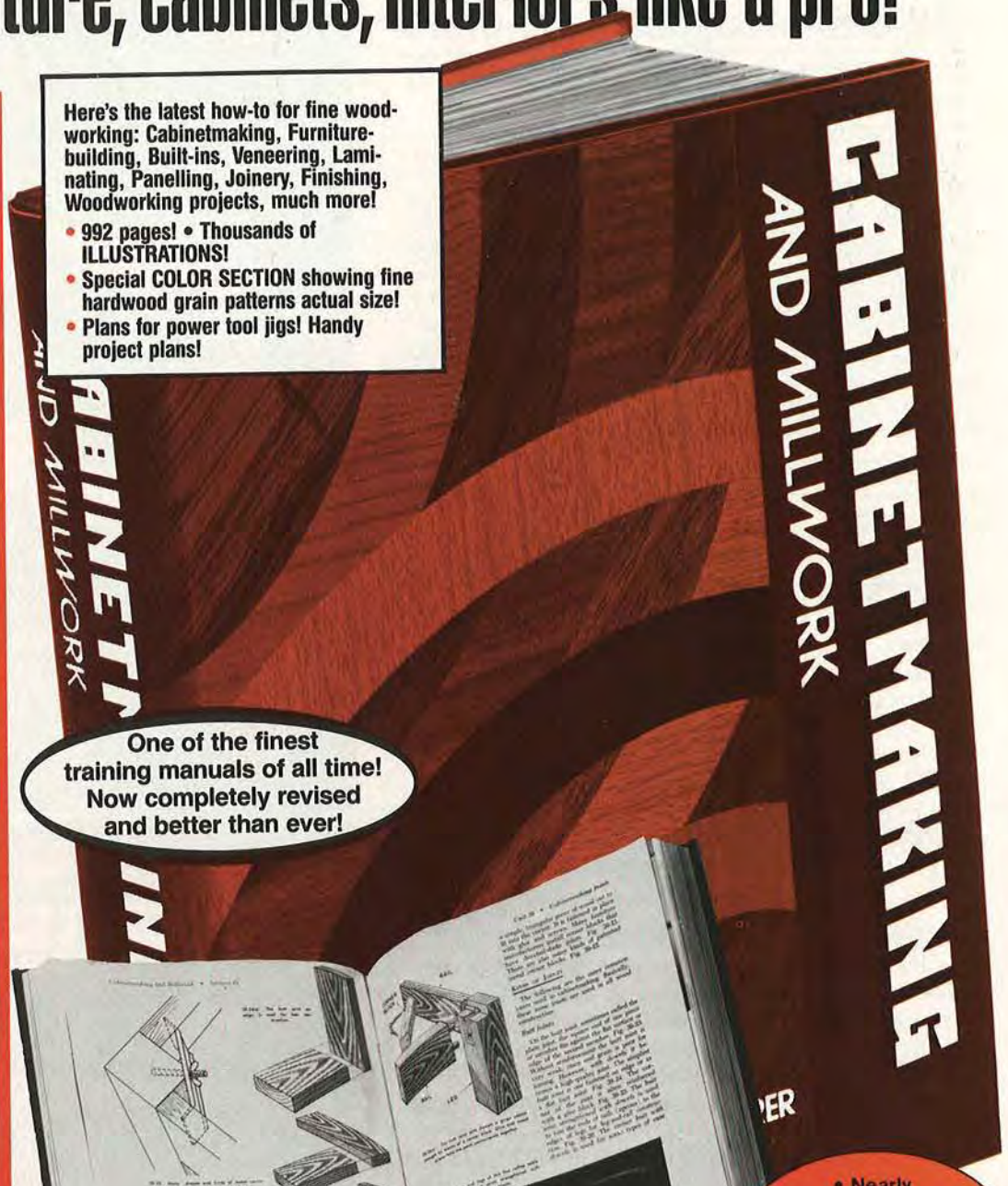

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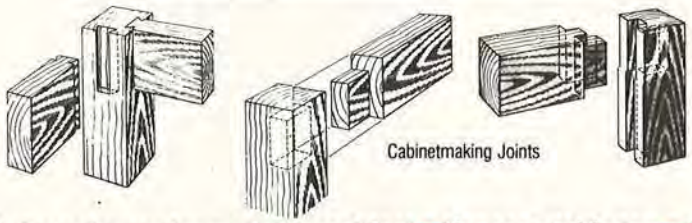

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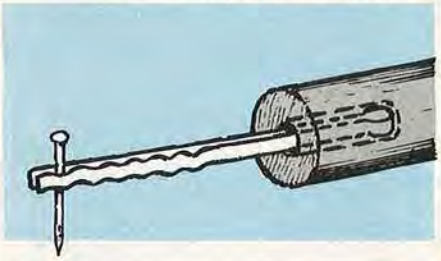
TINY TWEEZERS FOR TIGHT SQUEEZES

Having trouble getting a grip on tiny screws, brads, bolts, or other fasteners, especially when trying to install them in tight spots?

TIP: Get a good hold on the problem with these homemade tweezers. To make them, mount a bobby pin in the end of a 6" length of 5/16" dowel. Drill a 1/4"-deep hole in one end of the dowel, then force the looped end of the pin into the hole. If needed, secure the pin with toothpick wedges or a few drops of epoxy.

— Charles Whatley, Cincinnati, Ohio

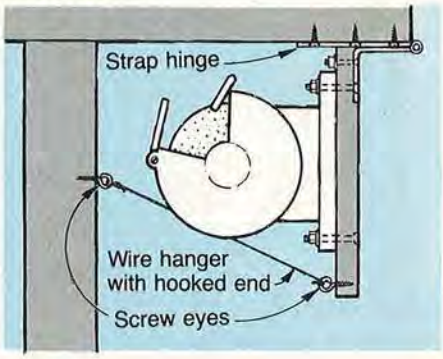


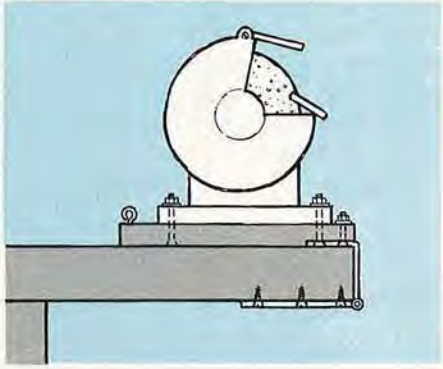
A SWINGING WAY TO SAVE BENCH SPACE

If you have a small, cramped shop, you probably value every extra inch of bench space you can get. Bench-mounted grinders and similar bench-mounted tools can really chew up the space.

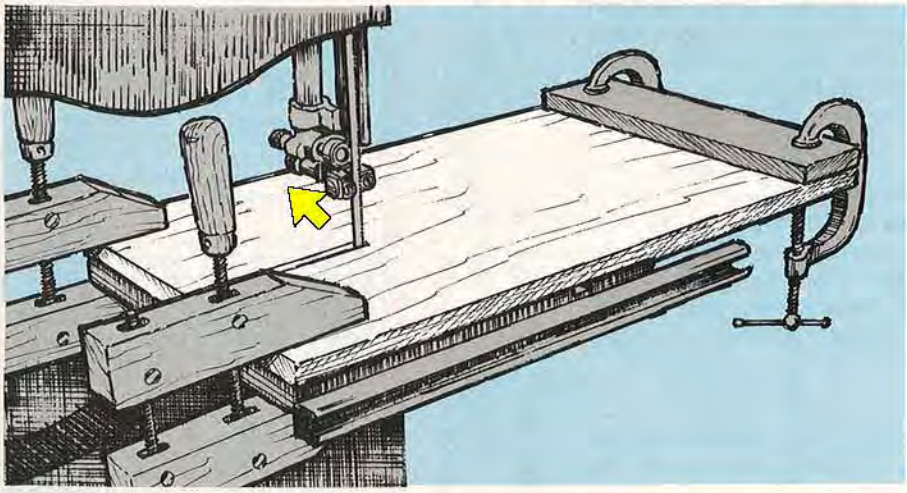
TIP: To better use limited bench space, you can install your grinder, so it swings down underneath the bench when you're through using it. To do this, screw a pair of 6" or larger strap hinges to the underside of the bench, as shown in the drawings *at right.* Hammer the ends back to lie flat on the bench top. Next, attach a plywood base to the hinges, then bolt the tool on the base. (Countersink the bolts so the base will sit flush on the bench.) Finally, install a pair of screw eyes and a wire hook (a coat hanger works well) to hold the tool back in its storage position.

— Fred Easley, Jerseyville, Ill.





QUICK 'N' EASY BAND SAW EXTENSION TABLE



Sometimes you may find your band saw table too skimpy to support the work. And you don't want to spend time making a complicated table extension.

TIP: Cut a piece of 3/4" plywood to the size needed, then cut out a slot to admit the band saw blade, as shown. Clamp the plywood extension to the table. If you want to rip wide stock, clamp or screw a wood fence to the table extension, parallel with the band saw blade. Support long boards with a stand positioned on the outfeed side of the saw.

— Don Butler, Waterford, Pa.

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— From the WOOD *shop*

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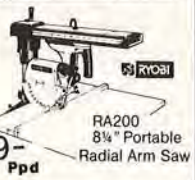

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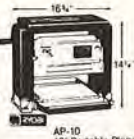

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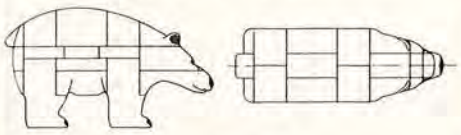

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TIPS FROM YOUR SHOP (AND OURS)

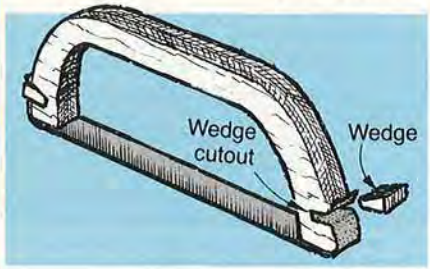
Continued from page 20

FINGER-SAVING SANDER

Hand-sanding large, contoured shapes, such as lathe turnings and decoys, can wear your fingers to the bone.

TIP: Homemade bow sanders of various sizes give excellent control with less effort. To make one, laminate two pieces of ½" to ¾" plywood together, band-saw the bow to the desired shape and size, then round-over the edges with a rasp and sandpaper. Then, cut wedge-shaped slots ½" to ¾" deep at each end to accept strips of cloth-backed sanding-belt material. Use the cutout pieces as wedges to fasten the strips into the slots.

— Lloyd McCabe, Scarborough, Ont., Canada



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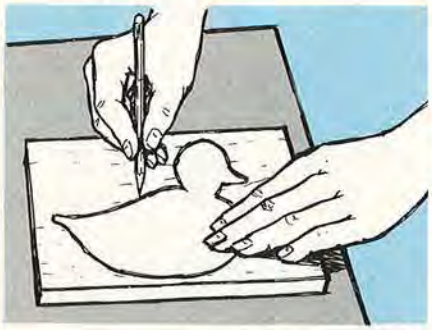
TIP: Make your templates out of scraps of plastic laminate, such as that used for countertops. Tape your pattern to the laminate and cut out the shape on a scroll saw fitted with a fine-tooth blade. The laminate is durable, yet easy to cut and file to precise shapes. Also, you can pencil notes on it and later erase the pencil marks.

— Chip Schmidt, Cedar Falls, Iowa



Continued on page 24

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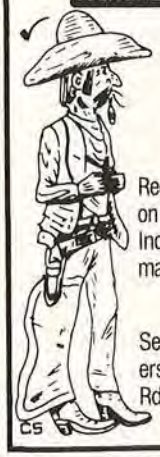

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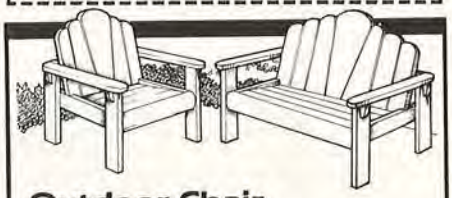

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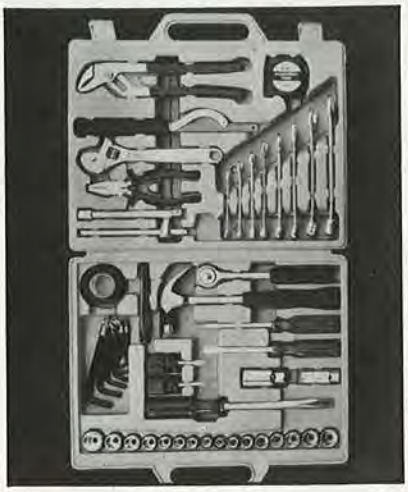

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5395	3/8 sgle sp hammer drill kit	203	150
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TIPS FROM YOUR SHOP (AND OURS)

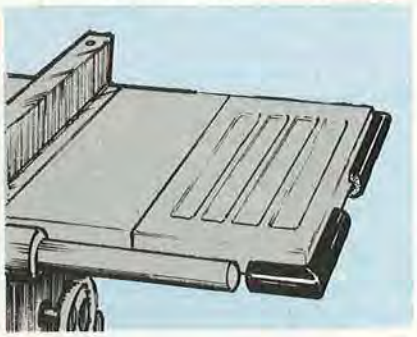
Continued from page 22

SAVING LITTLE HEADS FROM "OWIES"

Do you have little visitors in your shop who are just the right height to bang their heads on extension tables on your table saw or other equipment?

TIP: Foam rubber pipe insulation makes an inexpensive and effective protective cushioning for those nasty, sharp underside edges. The soft tubular material comes with a lengthwise split that clamps to the lower edges of the extensions. Trim to fit with scissors. If necessary, tape the insulation to keep it in place.

— Alan C. Sandler, Garnerville, N.Y.

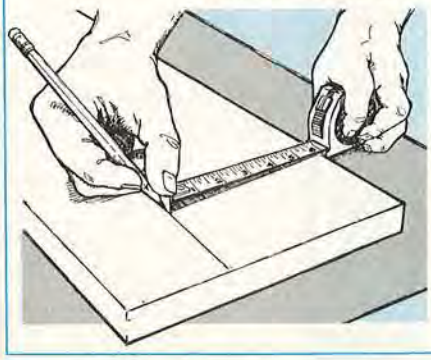


ANOTHER WAY TO LEAVE YOUR MARK

How can you draw a line parallel to the edge of a board when your marking gauge, try square, or combination square isn't handy (or long enough)?

TIP: Use your tape measure. First, measure the desired width and lock the tape in place. Then, using the tape body as an edge guide, hold a pencil against the hook, as shown. Slide the tape along, keeping it 90° to the edge as you mark.

— From the **WOOD** *shop*



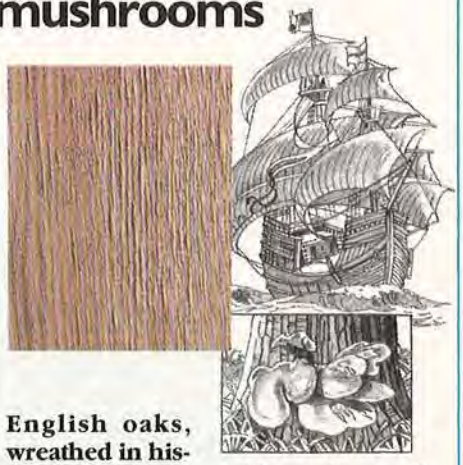
ENGLISH OAK... of sailing ships and mushrooms

Wood connoisseurs always mention English oak among their choices of the world's finest woods. Yet, if it weren't for some quite unusual occurrences, English oak may have never risen above the ordinary. The first of these relates to why some people call this wood "Pollard" oak.

Until the mid-19th century, England's sailing ships were made of oak. For stout timbers, shipwrights looked to the very old trees covering the English countryside. But so did England's seafaring rivals. In fear that invaders would cut their precious oaks, loyal Britons "polled," or topped, whole tracts. The trees did not die, however. Instead, the stumps developed new shoots and the trunks grew thick and gnarled, producing many large burls — one on record from the early 1900s weighed 22,000 pounds and measured 9′ in diameter. From these trees comes the swirled-figure veneer often referred to as Pollard oak.

The second occurrence deals with the appealing color of English oak. Its distinguished tan has prompted the wood to also be called English brown oak. The color actually comes from mushrooms growing on the tree. Tannic acid in the oaks sustains the thriving life of the mushrooms. And as they grow, a chemical reaction slowly turns the wood a light brown.

According to English legend, people, during the superstitious days of King Arthur, believed the oaks to be enchanted. The mushrooms were thought to be tongues of gallant knights killed in past battles. So, the mushrooms were never picked for fear the original owners would someday return to claim them.



English oaks, wreathed in history and legend, yield wood warm in color and heralded for texture.

Photograph: Bob Calmer
Illustration: Jim Stevenson

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HOW DO I KNOW WHICH PLANER IS RIGHT FOR ME?

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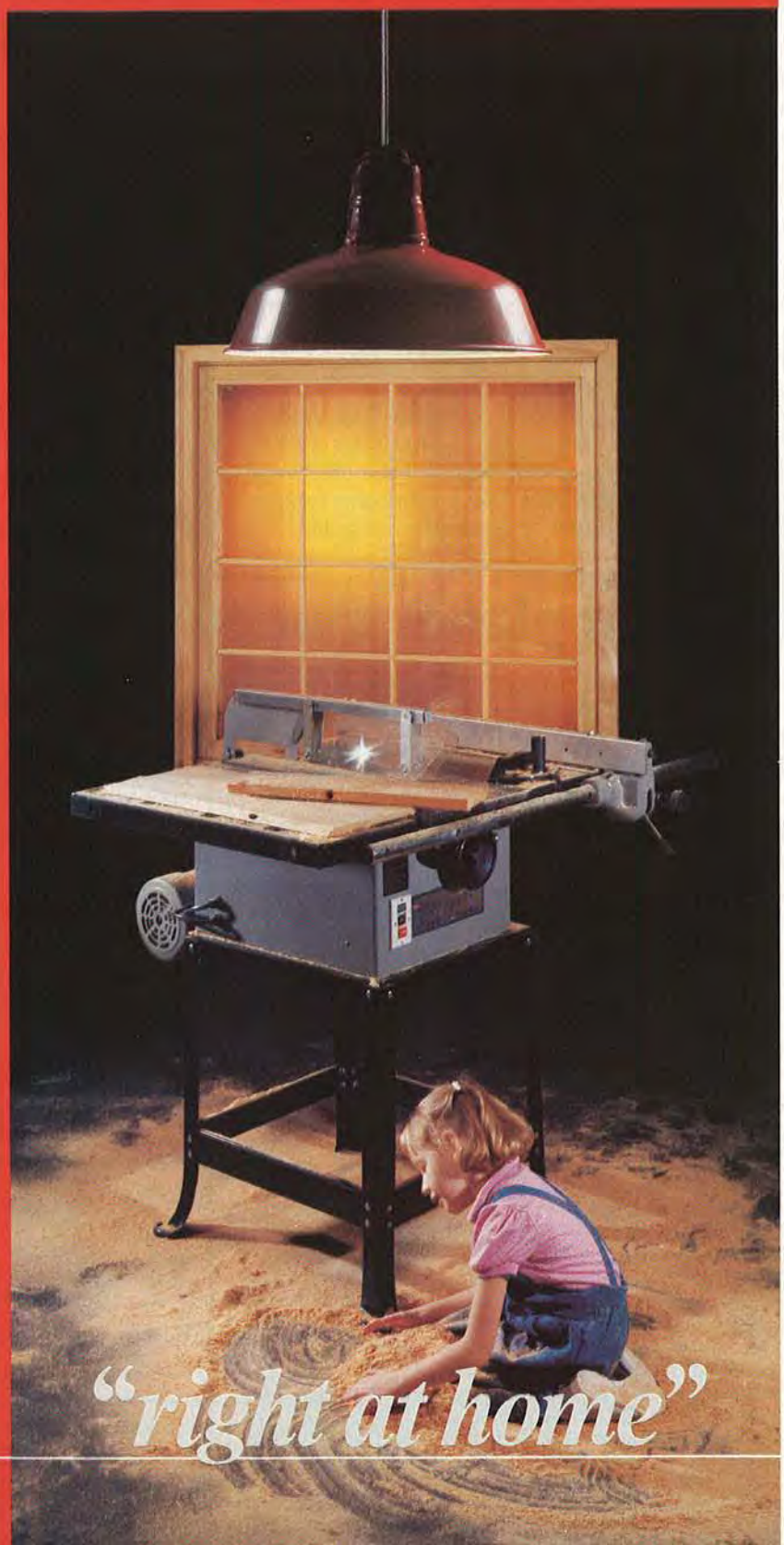

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The JET 10" tablesaw features a powerful 1½ HP, 115/230V, single phase motor with manual overload reset. The table is a precise 20" x 27" durable cast iron, with two extension wings providing a large 27" x 40" working surface. This allows the extension of the rip fence to 25" for ripping a full sheet of plywood. The rip fence has finger tip control of 1/16" for precise adjustments along the front rail guide which is graduated from 0"-25". The rip fence is also equipped with a positive lever lock which secures it tightly into position and automatically aligns the fence parallel to the blade to insure quick and accurate rip cuts.

Conveniently located hand wheel controls, elevate and tilt the blade. Saw depth cuts range from 1⅞" at 45° to 3⅛" at 90°. The miter gauge has positive stops at 45° and 90° and allows cuts up to 60°. The blade guard is provided with a speader and anti-kickback attachment to help minimize blade binding and assure safety to the user. The saw comes with a regular blade insert, a dado insert and a sturdy open tiger foot stand. All this standard for one low price.

With 30 years of experience JET offers top quality, competitively priced woodworking machinery with replacement parts, repair services and technical advice immediately available.

To see this tablesaw contact your local dealer listed or call 1-800-426-8402. Ext. 305.

Quantities are limited at these prices so don't delay.

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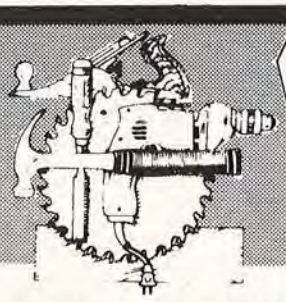

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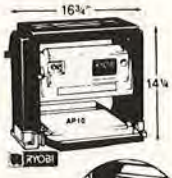

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DB-050	50 Pc. Drill Bit Set	59
EC-900	5 Pc. Shaper Cabinet Set	269
WC-106	6 Pc. Chisel Set	27
WC-110	10 Pc. Chisel Set	47
CS-106	6 Pc. Carving Set	59
CS-112	12 Pc. Carving Set	109
TT-108	8 Pc. Turning Set	47
LU72M010	10"X40T Gen Purpose	39
LU73M010	10"X60T Cross-Cut ATB	34
LU82M010	10"X60T Plywood TCG	38
LU84M010	10"X50T Combination	36
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312	Offset Trimmer	133
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315-1	7¼ Circ. Saw 13 Amp	99
319	Tilt Base Trimmer	138
320	Abrasive Plane	95
330	Speed-Bloc Sander	52
351	3X21 Belt Sander	126
352	3X21 Belt Sander W/Bag	130
360	3X24 Belt Sander W/Bag	185
361	3X24 Belt Sander	175
362	4X24 Belt Sander W/Bag	198
363	4X24 Belt Sander	185
503	Wormdrive W/Bag	337
504	Wormdrive 3x24	328
505	½ Sheet Pad Sander	104
513	Lock Mortiser	699
518	3HP 5 Speed Router	335
520	3HP Production Router	298
536	1½ HP Speedmatic	189
537	1½ HP Speedmatic D/HDL	219
621	⅜" VSR Drill	84
630	1 HP Router	99
666	⅜" T/HDL VSR Drill	115
690	1½ HP Router	115
691	1½ HP D/Handle Router	139
695	Shaper Table W/Router	199
696	Shaper Table	104
5008	Dovetail Jig	69
5009	Mortise-Tenon Jig	39
7510	¼" Drill	119
7511	⅜" Drill VSR	114
7514	½" VSR Drill	119
7533	Adj. Clutch Screwgun	149
7545	Drywall Screwgun	109
7548	Top Handle VS Jigsaw	128
7648	Barrel Grip VS Jigsaw	125
9118	Porta-Plane Kit	186
9314	Panel Saw Kit	139
9100	American Classic Router	115
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1198VSR	½" Hammer Drill	129
1272	3X24 Belt Sander	157
1272D	3X24 Belt Sander W/Bag	164
1273	4X24 Belt Sander	169
1273D	4X24 Belt Sander W/Bag	178
1288	½ Sheet Sander	108
1581VS	T-Handle Jig Saw	124
1582VS	Barrel Grip Jig Saw	118
1600	2¼ HP D-Hdl Router	239
1601	1 HP Router	85
1602	1½ HP Router	109
1603	D-Hdl 1½ HP Router	139
1604	1¾ HP Router	118
1606	1¾ HP D-Hdl Router	144
1608	Laminate Trimmer	79
1608T	Tilt Base Laminate	99
1609	Offset Trimmer	115

1609K

$158.

1609K	Installers Kit W/3 Different Bases & Case	158
1651	7¼" Circular Saw	99
1920VSRK	⅜" Cordless Drill VSR	89
1921VSRK	⅜" VSR Crds Scru-Drill	109
1942	Heavy Duty Heat Gun	79
3238VS	Jig Saw Orbital	99
3270D	3X21 Belt Sander W/Bag	109
3258	3¼" Plane	109
11202K	Rotary Hammer Kit	379
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90300	3¼ HP Production Router	295
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91066	½" Mighty Midget Drill	115

Makita Power Tools

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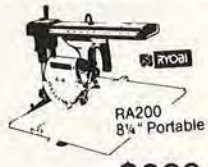
1100	3¼" Planer Kit	199
1805B	6½" Planer Kit	348
1900BW	3¼" Planer Kit	119
2708	8½" Table Saw	219
3601B	1¾" HP D/HDL Router	139
3612BR	3 HP Plunge Router	199
3700B	Laminate Trimmer	99
3700DW	Cordless Trimmer	119
3705	Offset Trimmer	139
4014NV	VS Blower	119
4200N	4½" Trim Saw	119
4300DW	Cordless Jig Saw	119
4301BV	Orbital Jig Saw	159
5005VA	5½" Trim Saw	119
5007NB	7¼" Circular Saw	115
5007NBA	7¼" Saw W/Brake	129
5081DW	Cordless Circular Saw	129
5201NA	10¼" Circular Saw	299
5402A	16" Beam Saw	349
5600DW	6½" Cordless Saw	169
6000R	⅛" Uni-Drill	125
6010SDW	⅜" Cordless Drill	49
6012HDW	⅜" Cordless Drill Kit	119
6013BR	½" Drill	129
6070DW	¼" Cordless VSR	79
6801DBV	Drywall Screw Gun	99
6802BV	Texs Screwgun	129
9030	1"x21" Belt Sander	149
9045N	½ Sheet Sander W/Bag	119
9501BWK	4" Grinder Kit	84
9820-2	Blade Sharpener	169
9900B	3X21" Belt Sander W/Bag	139
9924B	3X24 Belt Sander	139
9924DB	3X24 Belt Sander W/Bag	159
B04510	½ Sheet Pad Sander	49
B04550	½ Sheet Sander W/Bag	49
B04530	6" Round Pad Sander	59
DA3000DW	Cordless Angle Drill	129
DA3000R	⅜" VSR Angle Drill	139
DP3720	⅜" VSR Drill	59
DP4700	½" VSR Drill	119
JR3000V	VS Recip Saw Kit	129
LS1000	10" Miter Saw	219
LS1430	14" Miter Saw	439

RYOBI POWER TOOLS

Item #	Description	Sale
AP-10	10" Planer	$339
AP-10C	Planer with Dust Chute attachment for Vacuum	359
DC-1	Dust Chute For AP-10	25
EB-1	Extra Blades For AP-10	29
B7075K	3X21 Belt Sander Kit	129
B7100	3X24 Belt Sander	129
B7200A	4X24 Belt Sander	189
BD10R	Cordless Screwdriver	44
BD101R	⅜" Cordless Drill	47
BD1025RK	Driver Drill Kit	125
D1010	⅜" VSR Drill	89
E4000	TEX Driver HVY DTY	119
JSE60	VS/Orbital Jig Saw	129
L120U	3¼" Planer	109
R30	¼ HP Router	97
R50	½ HP Plunge Router	99
R150K	1 HP Plunge Router Kit	109
R151	1 HP Plunge Router	109
R500	3 HP Plunge Router	159
R501	3 HP Plunge Router	164



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RA2500	10" Radial Arm Saw	389*
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TR30U	Laminate Trimmer	79
TS251U	10" Miter Saw	169
TS251US	Miter Saw with Freud LU85 10X80T Teflon Blade	219
TS380	14" Miter Saw	339
W640C	7¼" Circular Saw	109
BS50N	9" Resaw Bandsaw	749*
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AH-115	Planer Jointer	1395*
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Item #	Description	Sale
TR12	3 HP Plunge Router with complete accessories package	$169
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TR6	Tilt Base Trimmer	89
CR10V	VS Orbit Recip Saw	109
C6DA	6½" Cordless Saw	119
SB75	2 SPD 3X21 Belt Sander	139
SB8T	2 SPD 3x24 Belt Sander	149
C10FA	10" DELUXE Miter Saw	269
C15FB	15" DELUXE Miter Saw	425
CJ65VA	Orbital Jigsaw	149
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Tripod roller stand $39. Call for prices on other HTC products!

Print this article

ASPEN

Abundant, blonde, and splinter-free

Aspen, due to sheer quantity alone, supports much of the logging industry across the Great Lakes states and Canada. Abundant because it propagates and grows rapidly in areas cleared by fire or harvest, aspen has many commercial uses. You'll find it in furniture, toothpicks, matchsticks, boxes and crates, paneling and chipboard. And, this plentiful tree has been a popular source for paper pulp since the late 1940s.

Beavers love aspen bark and consider it a staple food. These busy creatures, forever dam-building, also favor the wood for construction. They'll often gnaw down trees a half-mile or more from their damsite, then drag or float them home. Grouse, too, cherish aspen, but for its succulent seeds — so small that it takes over two million to make a pound.

Wood identification

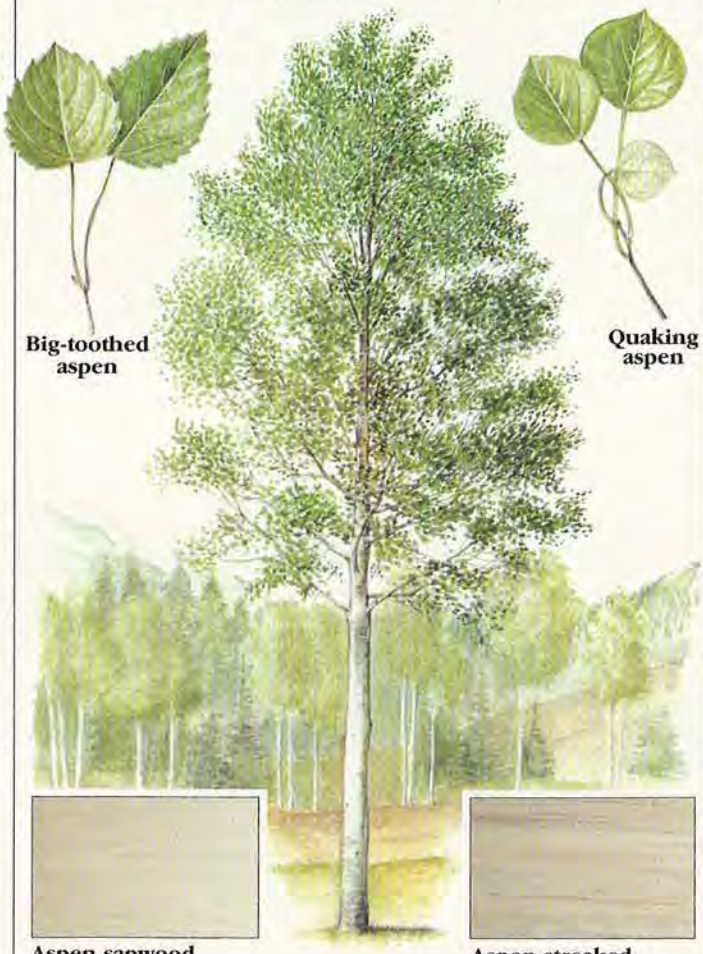
Quaking aspen *(Populus tremuloides)*, so-called because its leaves flutter in the slightest breeze, has an unbelievably wide growing range. It grows in a mostly northern belt stretching from Labrador and Newfoundland to Alaska's Yukon River. But, you can even find it in Mexico and Tennessee. Bigtooth (or large-tooth) aspen *(Populus grandidentata)*, which also quakes, prefers the Great Lakes states and New England.

Kin to willow and cottonwood, aspen rarely exceeds 60' heights and diameters of 20″. In their first 20 to 30 years they grow rapidly, and quickly renew a forest.

Bark on young trees may be white or greenish white, with dark gray or black welts and ridges. On older trees the bark can be 2″ thick, black near the base, and deeply fissured. If you confuse aspen's bark with that of white birch, the leaves provide identification. Both aspen have oval-shaped leaves with toothed edges and stems flattened on the sides.

Sapwood comprises the majority of wood in aspen. It has the whiteness of holly or poplar. The small heartwood core produces light brown wood, often streaked and discolored. It weighs 25 pounds per cubic foot.

Fine-grained, straight, and uniform in texture, aspen generally lacks distinct pattern. Occasional mottle- and stripe-figured logs become veneers.



Working properties

Aspen doesn't contain resin, and has toughness as well as exceptional stiffness. The wood resists splitting in nailing or screwing, yet you can work it easily with hand tools because of its softness. It also glues well.

Due to the tendency for aspen's wood fibers to fuzz when worked, you need to use tools with sharp blades and cutters. While this wood takes paint readily, it blotches when stained unless you first apply a sealer.

You'll find aspen a stable wood that wears without splintering. However, in conditions favoring decay, it deteriorates.

Uses in woodworking

For carving, aspen makes a first-rate substitute for basswood. You also can fashion it into light-duty furniture, solid paneling, and millwork.

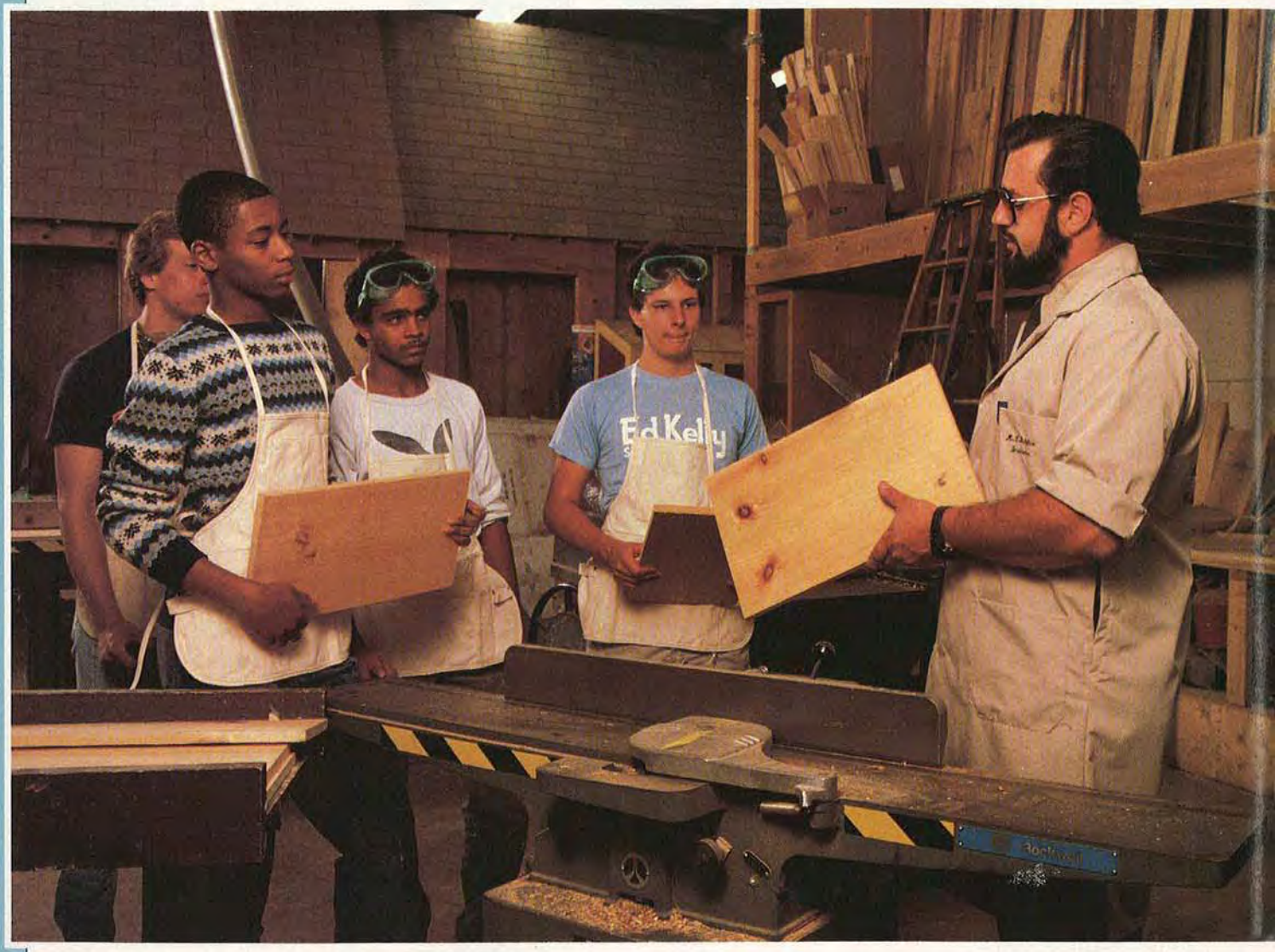
Aspen has no odor and imparts no taste to foodstuffs, so it's ideal for baskets, bowls, and containers. Children's toys made from aspen remain splinter-free.

Cost and availability

Across the southern reaches of the nation, aspen lumber may be hard to find. Where sold, however, the boards will be high quality, but generally neither unusually wide nor thicker than 1″. Expect to pay about $1.15 per board foot for lumber and around 50 cents per square foot for mottle- and stripe-figured veneer.

Illustration: Steve Schindler
Photographs: Bob Calmer

"The World's Greatest



Above. **In the school shop, Carmen explains jointer basics to (from the left) John Otto, Andy Gallian, Marshan Marshall, and Douglas Outlaw.**

"I believe in Old World craftsmanship, and that students learn by building projects, even with hand tools."

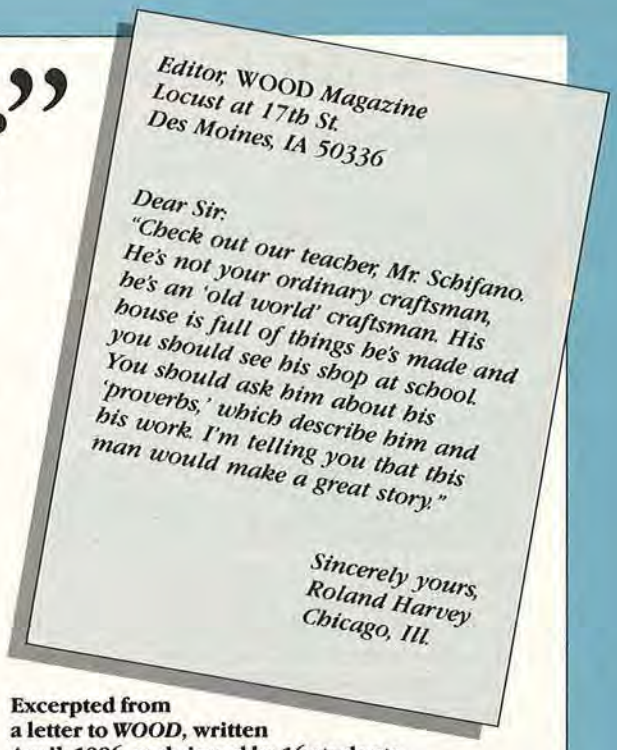
Print this article

Carmelo "Carmen" Schifano, 33, teaches cabinetmaking at a public high school in one of the Windy City's most economically depressed, crime-ridden neighborhoods. He has to use everything he's got to get his points across: the roar of a former Marine, a philosopher's proverbs, and friendship.

Carmelo lives with his wife, Anna Maria, and their young sons, Joseph and Carmelo, Jr., on Chicago's South Side. We visited him there, and in school, to see how he earns such a glowing reputation.

Shop Teacher"

Carmen Schifano Cares About Inner-City Students — and They Cared Enough To Write!



Editor, WOOD Magazine
Locust at 17th St.
Des Moines, IA 50336

Dear Sir:
"Check out our teacher, Mr. Schifano. He's not your ordinary craftsman, he's an 'old world' craftsman. His house is full of things he's made and you should see his shop at school. You should ask him about his 'proverbs,' which describe him and his work. I'm telling you that this man would make a great story."

Sincerely yours,
Roland Harvey
Chicago, Ill.

Excerpted from a letter to *WOOD*, written April, 1986, and signed by 16 students.

Ride to work through Chicago's near-north side with Carmen Schifano, and you're glad he's a big man. A 265-pound, six-footer, he looks tough enough to hold his own not only in the inner city, but anywhere. Yet, when it comes to knocking people over, Carmen does it with ideas. His workshop: the woodshop classroom of Near North Career Metropolitan High School. He's a teacher and an artist in a neighborhood where people struggle for their daily bread.

"The majority of my students come from a public housing project called Cabrini Green," he explains. "That's file-box living, with families stacked in apartments one atop another. The thugs there create dangerous situations for a majority of generally good, wholesome people."

He understands his students and what they face daily, and talks their street language, because his own life hasn't exactly been a picnic. At age three, he moved with his family from their native Sicily to Belgium, and learned to speak French to get along. Then, the family immigrated to the U.S. and the Midwest's melting pot of Chicago. Carmen was ready for kindergarten, but couldn't speak English. His struggle with English caused him to flunk first grade, making him feel inferior.

"I was afraid to try," he comments. "What saved me was my art ability. I was always drawing, making things, working with my hands." Yet, more than anything, poverty influenced his future.

Carmen teaches manual skills from a background of hands-on experience

"I didn't have any choice about which high school I went to. There wasn't even enough money for me to ride the bus out of the district. Tilden Technical High School was closest to us, so I went there," Carmen recalls.

At Tilden, he felt out of place. "We lived in a predominantly Irish neighborhood, and I was Sicilian. There were lots of areas I couldn't go to or I'd get beaten up," he remembers. But, Tilden became a turning point in his life. He credits two teachers there for their influence.

One was George Whyte, who taught woodworking and was a father-figure to him. "A lot of the philosophies and ideals I try to give to my students come from him," relates Carmen. "A lot of times we wouldn't even work in the shop — we would just talk about the future, about goals and morals."

The other man was Henry Ratajski, a drafting teacher. Says Carmen: "He was a former Marine, regimented, and disciplined. I didn't know it then, but I needed both approaches."

Following a stint in the Marine Corps after high school, Carmen came back to Chicago and worked as a draftsman for a year. Wanting to take advantage of his manual skills, he entered Wasburne Trade School, studied carpentry, graduated, and began residential construction.

However, he mentally wrestled with thoughts of the future and how he might better himself. Carmen, a man with deep religious convictions, believes his dilemma was solved by God. "One day I was driving the freeway and it came through clearly — 'be a teacher.' So, it was decided." He went on to earn bachelor's and master's degrees in education from Chicago State University, while working a full-time construction job.

Teaching students how to 'fish' for a living

In the nine years Carmen has been teaching, he's followed a philosophy he puts in proverb form — something he does a lot: "You can give a man a fish, and he can eat for a day. But if you teach a man how to fish, he can eat for the rest of his life."

"My heart gets into teaching," comments Carmen. In fact, because of his deep involvement with his students, Carmen has been known to grow physically ill when some of them don't do well. He also can lose his temper.

"I get extremely emotional and blow up sometimes at some of my students' lack of self-discipline. That's the Mr. Ratajski coming out. After the blowup, I sit down and philosophize with them, and restore their self-confidence. That's like Mr. Whyte."

Carmen gives his students advice from experience. "I tell them that

Continued

society now isn't like the 1960s when I was growing up," Carmen relates. "Color or nationality doesn't make the difference whether or not you succeed now. What matters is whether or not you're qualified for a job."

To this Chicago teacher, concern for a student remains foremost. Years ago it was Mr. Whyte who was concerned with him. "He once told me to use mahogany for a cocktail table. I made many little mistakes at first because I was scared that I wouldn't be able to pay for the wood. But when the table was finished it was nearly perfect. He said I owed him nothing. My craftsmanship had been enough." The young Schifano's project went on to win first place that year in the Industrial Education Exhibit at Chicago's Museum of Science and Industry.

Students in Carmen's classes don't have to win anything with their work to be a success in his eyes. To him, success means opening their minds so they're ready for the future. Some don't hit the mark, at least right away. "I'll get letters from guys who really messed up here, and didn't listen.

"It's not like he's a teacher to us. He's a friend."

They'll tell me that now they know I was right, and they're going to turn their lives around. I got through to them, finally."

It's that attitude that prompts respect, and even a dose of love from his students. Like this comment from Marshan Marshall, 18: "It's not like he's a teacher to us. He's a friend."

Shops for production: Chicago's new, job-oriented industrial arts program

Fred Kane, Coordinator of Industrial Arts and Woodworking for Chicago's public schools, has overall responsibility for developing graduates who can find a spot in the work force. To meet that goal, he found himself an experienced workman in Carmen. Then he had him write a new vocational curriculum for the city's public school system.

Kane explains the project's emphasis: "In Chicago, we've been trying to train kids to be cabinetmakers and furniture makers. But graduates weren't being hired by production shops. So, for advice, we called in a team of people who work in the industry. Now, instead of teaching kids how to make one cabinet, we're going to teach them how to make 50. We're also going to emphasize the work attitude and ethic." According to Kane, that's another reason why Carmen was chosen — he has that work ethic.

To learn the real-world side of cabinetmaking, juniors and seniors who have mastered the basics get experience in the business side. They organize into companies, do market research in the classroom, set up production lines in the shop, and market their product. They try to make money, which will be reinvested in the shop. Students even keep time sheets, just as they'll have to when employed. Woodshops in the public schools have a new name, too. They're now called *Production Technology Laboratories.*

However, just as it's always been, woodworking skills must still be learned during the first two years. Carmen would have it no other way. "I believe in Old World craftsmanship, and that students learn by building projects, even with hand tools," he says.

Basic skills, such as how to use a table saw, are still required in the new, production shop orientation of Chicago's public high schools.

Hands, head, and heart make not only a great teacher... ...But an artist

In his home workshop, Carmen smoothes a basswood penguin with a Foredom tool. Other carvings cover his handcrafted workbench.

Carmen knows hard work. He's caulked seams in elevator shafts and worked on skyscrapers. But years ago he decided to turn his back on being what he calls a "Neanderthal carpenter" to concentrate on woodworking. Now, examples of his craftsmanship decorate his home.

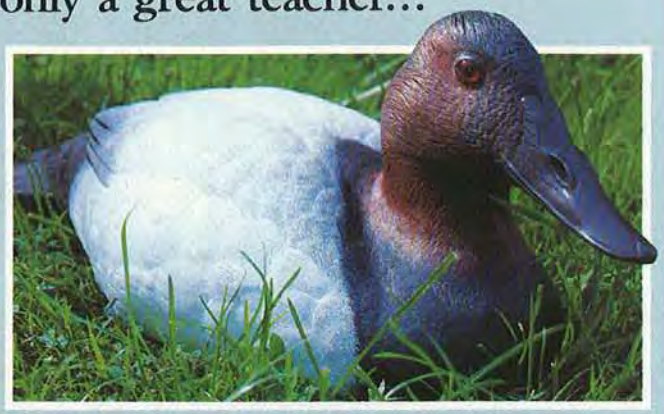
In one corner there's a carved duck that looks as if it's ready to quack. An eagle carving, that took nearly 2,000 hours to complete, won honorable mention at the 1985 Ward Foundation World Championship Carving Competition in Ocean City, Maryland. This event draws thousands of carvers from all over the world, and getting recognized isn't easy.

From his living room to the basement descends an eye-catching spiral staircase he designed and built from solid red oak. "I had checked out the ready-made offerings, and they cost thousands! So, I just decided to build my own," he recalls. Carmen practically had to "design it on the spot" because it wasn't as simple as it looked on paper. Each step locks into its section on the pole so it won't twist or move in any way. But, once he had that part figured out and constructed, Carmen was faced with building the handrail. To make the laminated oak rail fit and curve perfectly, Carmen actually bent it into place on the balusters.

Quoting a proverb, Carmen explains his love of artistic work: "If a man works with his hands, he's a laborer. If a man works with his hands and his head, he's a craftsman. But if a man works with his hands, his head, and his heart, he's an artist."

Two evenings a week, Carmen teaches adult education classes in woodworking at another inner-city school, Lane Technical High School. His adult students may even think more highly of him than his teenagers, since they choose to take woodworking in their leisure hours. These older students lavish praise on his craftsmanship. The letter that begins this article was written by one of them.

His response to praise comes hesitantly, and takes a spiritual turn. Says Carmen, "Looking over my life, the thing that has always come to my rescue and helped me was my ability to draw, to create, to construct. And I give God all the credit for that."



After nearly 200 hours of work, Carmen's canvasback drake floating decoy is ready to enter in an upcoming carving competition. The decoy was carved life-size.

In his home, Carmen exhibits the craftsmanship he teaches. He built this solid red oak spiral staircase between the living and recreation rooms. The rail, made of ¼" laminated strips, was bent in place on the staircase.

Written by Gregory C. Erickson Photographs: William Hopkins

LEG-RAIL

Two time-tested tables and chairs

Print this article

Some tables and chairs stand sturdy over the years; others are destined to wobble woefully almost from the day they're built. And more often than not, the difference lies in the strength of the joint used to attach the legs to the rails.

But you can't settle for anything less than a super-strong joint to hold the leg-rail assembly together. So, here are our preferred candidates: the *wood corner block* and the *mortise and notched tenon.*

Each joint has its advantages. For instance, corner-block construction allows you to detach the legs of large tables for ease in moving or storage. And, should the legs loosen, just tighten the nuts on the hanger bolts to snug the legs back against the rails.

The mortise and tenon makes a clean, good-looking joint for glass-top tables or other pieces where corner blocks would interfere with the design or appearance. This strong joint becomes even stronger when you notch the tenons and interlock them inside the mortises.

On the following pages, we'll walk you through the basic procedures for laying out, cutting, and connecting both types of joints. No matter which you choose for your project, we suggest you first go through a dry run. Use test "leg" and "rail" sections of the same wood you'll be using for your project, cut to final width and thickness. This hands-on experience should make the project go easier.

Design Note: *On many leg-rail joints, the rails do not align flush with the outside edges of the leg, but are set back slightly. Our layout procedure for both joints includes marking the setback distance, or reveal, for the rails. The amount of reveal will depend on the design of your project.*

WOOD CORNER

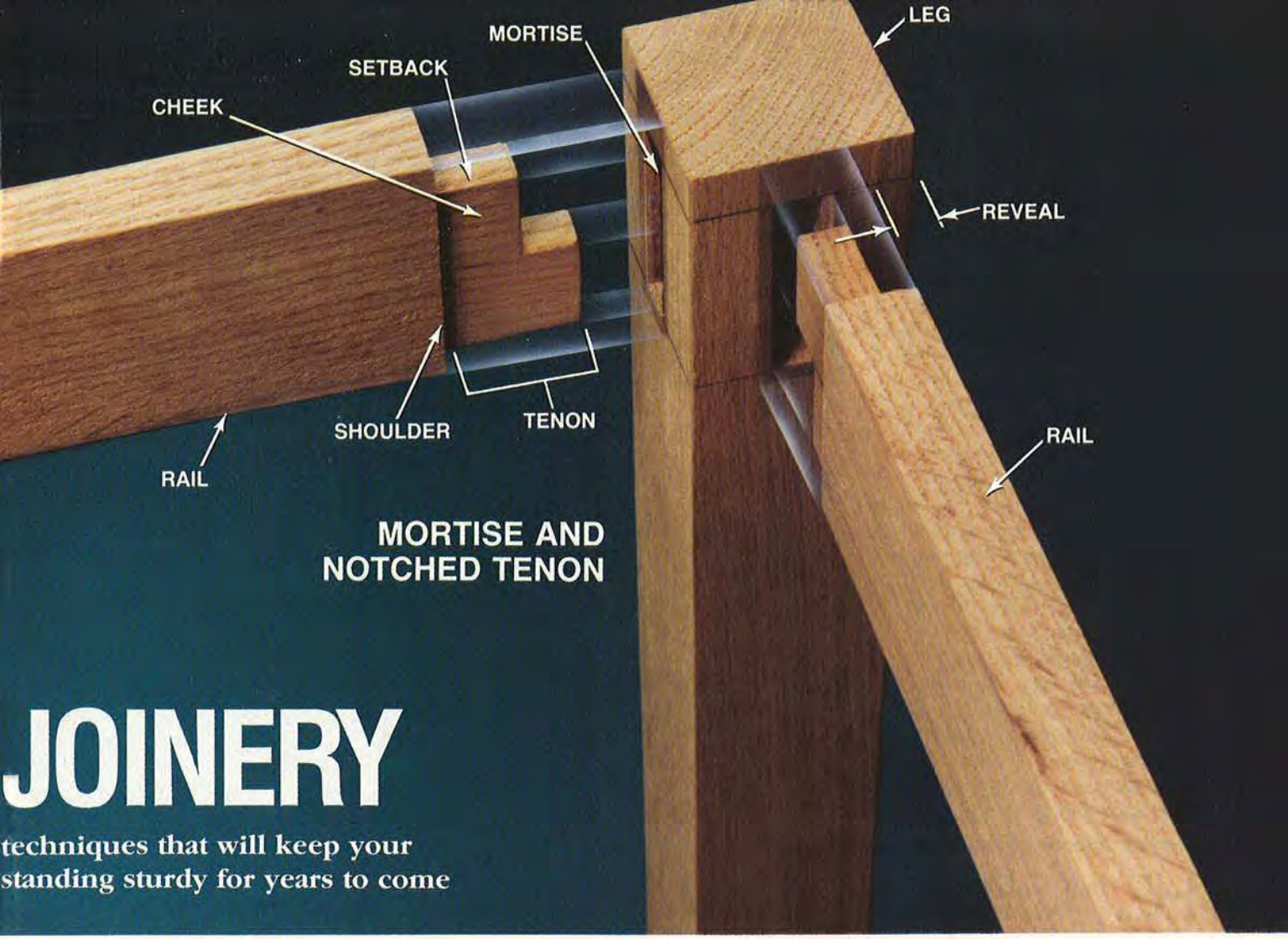
OUR JIG MAKES THE BLOCKS EASY TO INSTALL

You need to keep the rails aligned square to the leg while measuring for the corner block and installing it. So, we devised the jig shown *at right* to make it a one-person job. It holds the rails in position against the leg while you measure and mark for the block. With the rails clamped in position, you can then remove the leg to keep it out of the way while attaching the block to the rails.

START BY MAKING THE JIG

1 Select a scrap corner piece of ¾" plywood with perfectly square adjoining edges.

2 Cut the corner piece 18x18". Then, rip the inside corner of the jig as shown on the Corner Jig Drawing, *at right.*



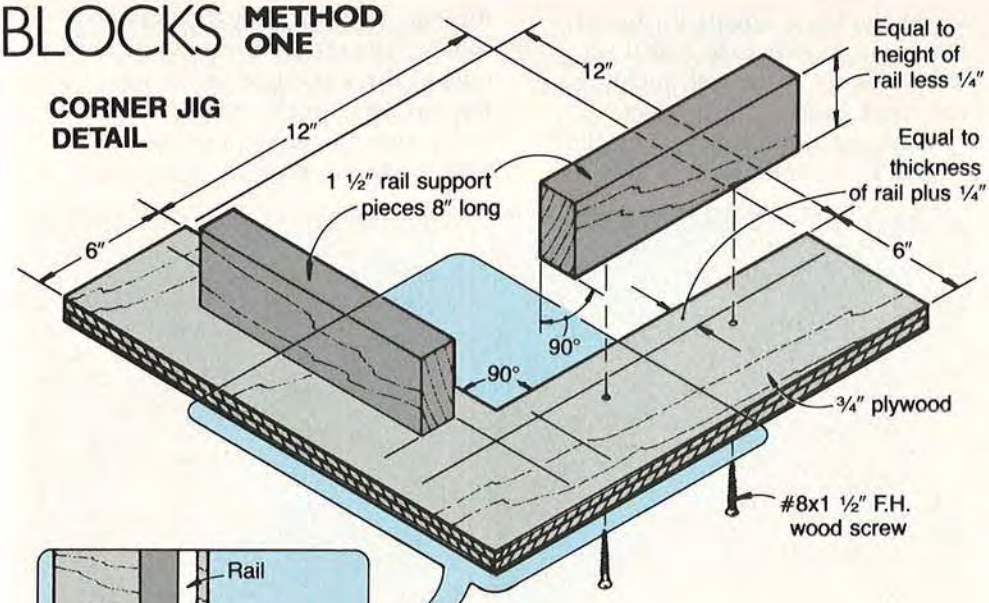
MORTISE AND NOTCHED TENON

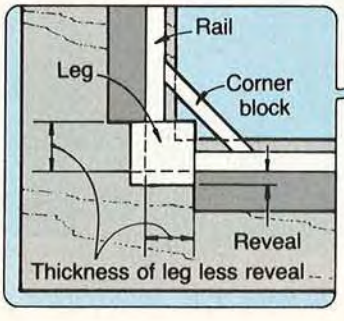
JOINERY

techniques that will keep your standing sturdy for years to come

BLOCKS METHOD ONE

CORNER JIG DETAIL





3 Cut the rail support pieces from 1½" stock, then mark their positions on the plywood base. To position the supports accurately, you'll need to know the finished width and thickness of the legs and rails, also the desired reveal, as indicated in the drawing detail *at left.*

4 Screw the supports in position.

NOW, INSTALL THE CORNER BLOCKS

1 Cut the test leg and rail pieces to final size (they do not have to be full length). Position them in the jig with the face side of the rails against the rail supports. Then clamp the rails in position. If the rail ends don't butt exactly flush against the leg, recheck the leg and rail ends for square. Square the ends, if necessary. Next, place the 45° edge of your combination square against one of the rails and

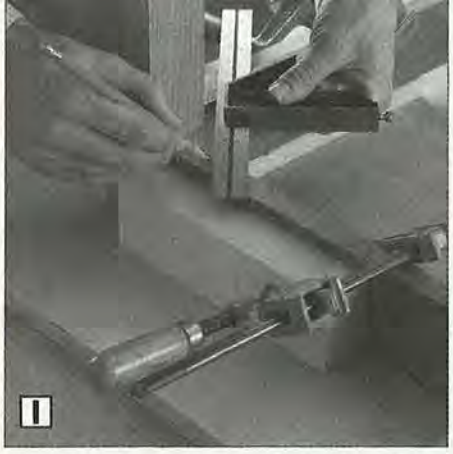
Continued

LEG-RAIL JOINERY

mark the location of the corner block on the rails as shown in photo 1. Allow ⅛" to ¼" clearance between the back side of the block and the inside corner of the leg. This keeps the corner block from interfering with the leg when you tighten the hanger bolt later.

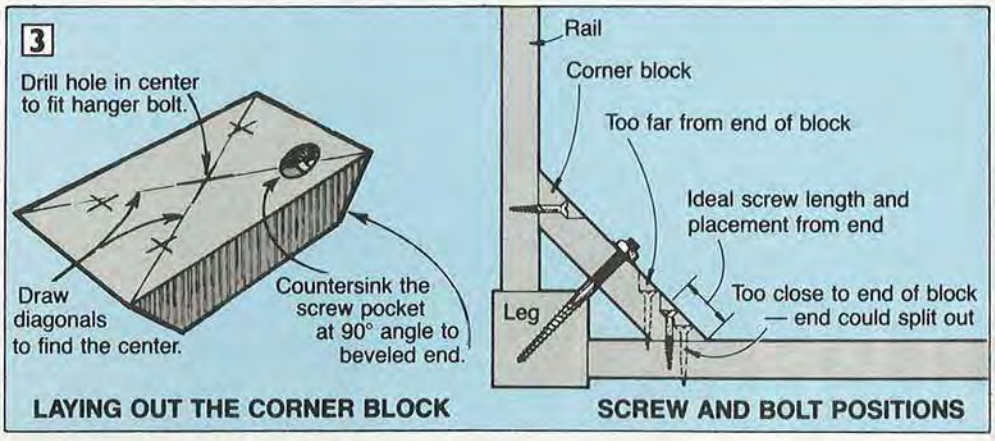
2 Crosscut the corner block 2" longer than the finished length. Now, align the back side of the block with the two marks you made on the rail. Mark the front side of the block where it intersects the inside edge of the rails for finished length, as shown in photo 2.

3 Use your combination square to extend the marks across the block's face. Then, set your table saw at 45° and bevel-cut the corner block to finished length. On the face side of the block, find the centerpoint and mark the hanger bolt and screw locations, as shown on sketch 3. The sketch also shows the optimum pilot-hole angle, the ideal screw length and placement, and the hanger bolt location.



Place leg and rails in the jig, then mark the corner-block location on the rails.

Align the corner block with the marks on the rails, then mark block for finished length.


3
Drill hole in center to fit hanger bolt.
Draw diagonals to find the center.
Countersink the screw pocket at 90° angle to beveled end.
LAYING OUT THE CORNER BLOCK
Rail
Corner block
Too far from end of block
Ideal screw length and placement from end
Too close to end of block — end could split out
Leg
SCREW AND BOLT POSITIONS

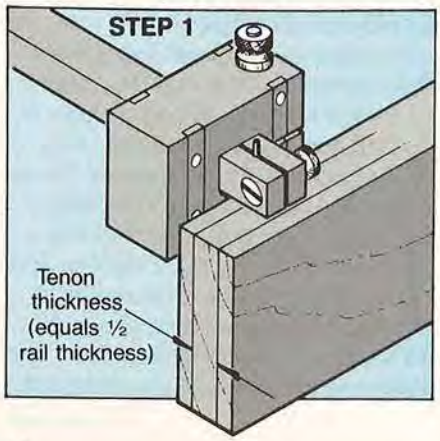
THE MORTISE AND NOTCHED TENON METHOD TWO

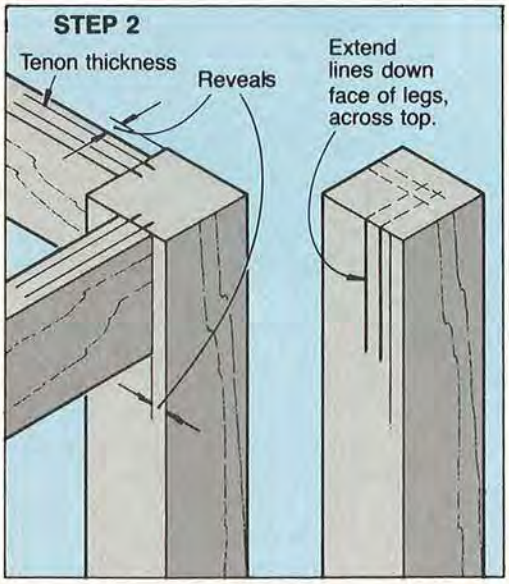
Use the following procedure to make your test joint. Then, when you've got the hang of it, see page 38 for several tips that will make laying out and cutting the rest of the joints go more quickly.

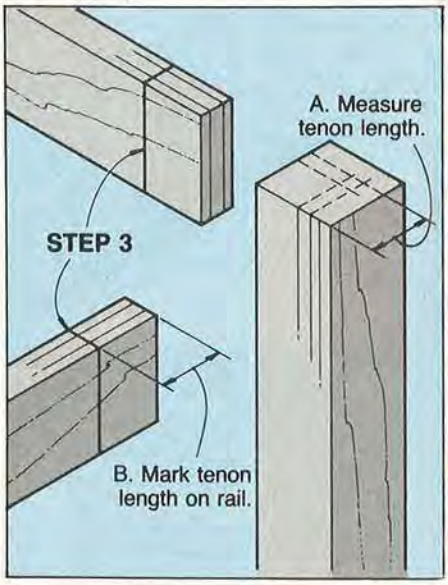
FIRST, LAY OUT THE MORTISES AND TENONS

1 Mark the desired tenon thickness on the end, top, and bottom of the rails. Typically, the tenon thickness equals ½ the rail thickness. In that case, you'd set the gauge to ¼ the rail thickness and mark in from both edges.

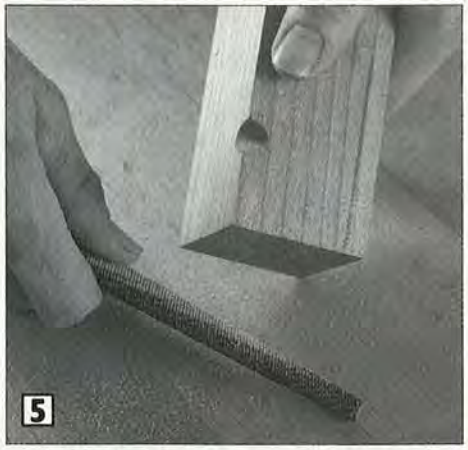
2 Mark the desired reveal on the leg. Then align the face side of the rails with the reveal marks and transfer the tenon thickness on the rails to the top edges of the leg. Extend these lines down the faces and across the top of the leg to plot the position of the mortises.







Glue the block ends, then drill the pilot holes and drive the screws.



Mark the hanger bolt location on the leg, then flatten the corner with a rasp.

Screw the hanger bolt into the leg, then attach the washer and nut, and tighten.

4 Drill the hole for the hanger bolt and apply woodworker's glue to the block ends. Position the block against the rails. With your drill and the correct-size screw pilot bit, drill pilot holes through the block into the rail as shown in photo 4. Drive in a screw after drilling each hole — if you drill all the holes before driving the screws, the block may shift, misaligning the holes.

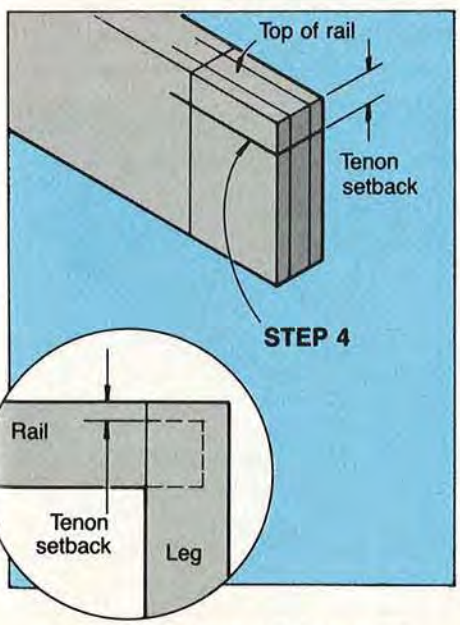
5 Place the leg in position against the rails and mark the location of the hanger-bolt hole on the leg. Remove the leg from the jig, then use a rasp to flatten the leg corner at the bolt-hole mark as shown in photo 5. This helps keep your drill bit from walking off center when you drill the pilot hole for the bolt.

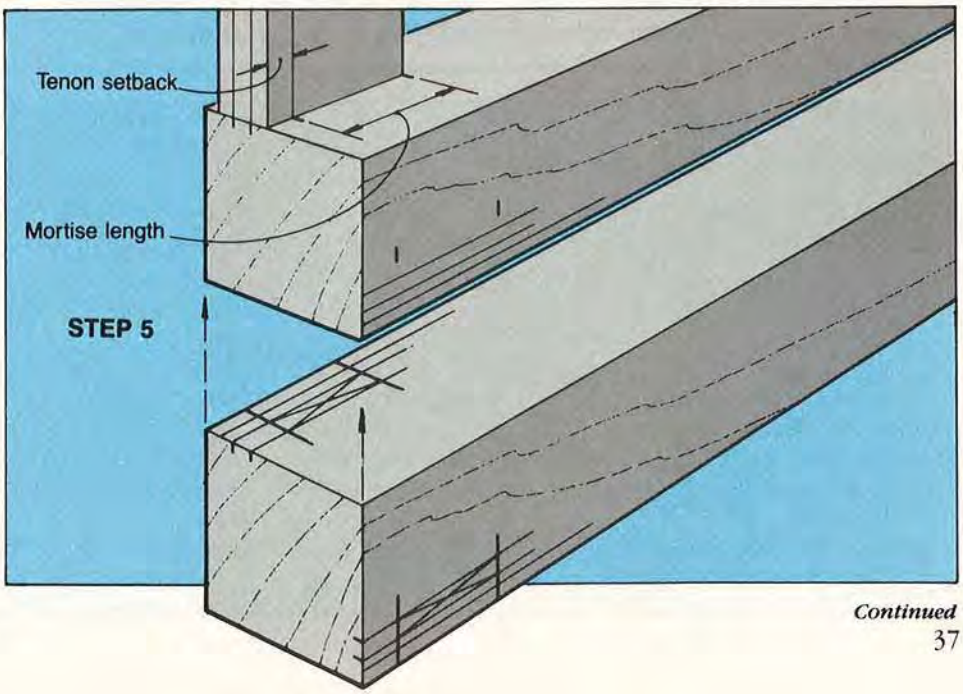
6 Reposition the leg in the jig, then drill a pilot hole in the leg for the hanger bolt. Screw in the bolt, then attach the washer and nut, and tighten as shown in photo 6. Repeat the above steps for each leg-rail joint on your project.

3 Determine the tenon length by measuring the mortise positions marked on the top of the leg. Now, transfer this measurement to the rails. Once you know the exact tenon lengths, you can calculate the overall lengths of the rails (the distance between the legs plus tenon lengths).

4 Measure and then mark the tenon setback on the rails (typically ⅜" to ½").

5 Transfer the tenon width measurement from the rail to the leg, then extend these lines to find the exact size and location of the mortise to be cut. (We like to mark the mortise location with an "X".)





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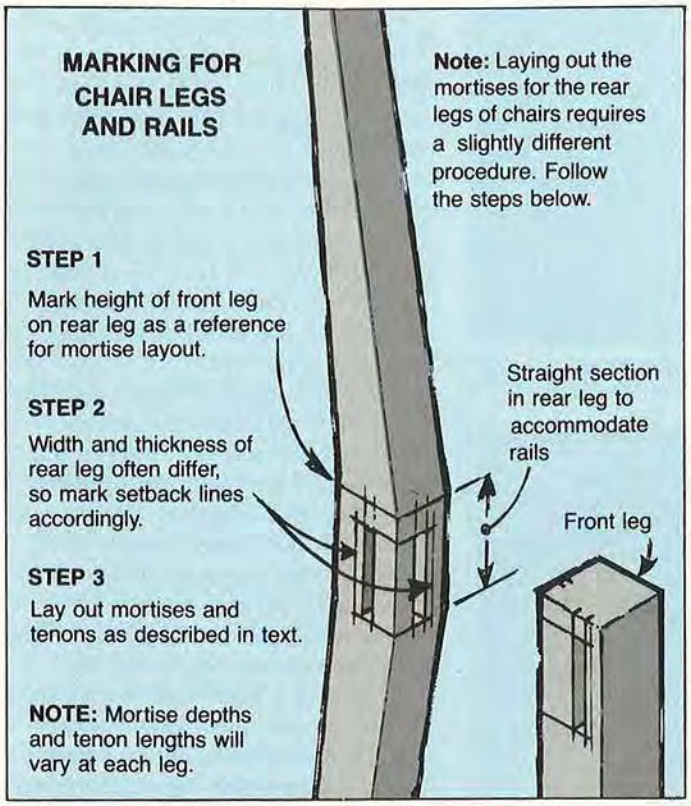
LEG-RAIL JOINERY


MARKING FOR CHAIR LEGS AND RAILS
Note: Laying out the mortises for the rear legs of chairs requires a slightly different procedure. Follow the steps below.
STEP 1
Mark height of front leg on rear leg as a reference for mortise layout.
STEP 2
Width and thickness of rear leg often differ, so mark setback lines accordingly.
STEP 3
Lay out mortises and tenons as described in text.
NOTE: Mortise depths and tenon lengths will vary at each leg.
Straight section in rear leg to accommodate rails
Front leg

To make the mortise, drill a series of holes to the desired depth.

Square up the mortise with chisels. First, use a narrow chisel to make stop cuts as shown, then a wide chisel for the sidewalls.

NEXT, CUT THE MORTISES

1 To cut out the mortises, you first drill a series of holes (we found that a brad-point bit in a drill press works well). Choose a bit with a diameter slightly smaller than the mortise width. This makes it easier to cut clean, straight walls with your chisel. Drill the holes 1/16" deeper than the tenon length to allow for a glue pocket when you glue each tenon into its mortise. Drill the end holes first (photo 1), then the ones in between.

2 Use a chisel the same width as the mortise to make *stop cuts* about 1/4" deep at each end, as shown in photo 2. These cuts make the ends square and keep the wood from splitting when you clean up the sidewalls. Use a wider chisel for the sidewalls, taking 1/4"-deep cuts to remove the waste. Continue this sequence until you reach the bottom of the mortise. Then, use your narrow chisel, beveled side down, to clean out the bottom of the mortise.

THEN, CUT THE TENONS

As you know, there's more than one way to do almost anything, including cutting a tenon. We like to cut them on the table saw, using an extension fence on the miter gauge, and a 3/4" dado set. Here's how:

1 Lay the rail flat on the table saw and against the blade. Set the height of the blade to the mark for the bottom edge of the tenon. This determines blade height for cutting the tenon cheek. Now, cut a small notch in both sides of the tenon

TIMESAVING TIPS FOR AN ACTUAL PROJECT

You don't have to repeat the entire layout and cutting procedure for each individual leg-rail joint of your project. Instead, proceed as follows:

1 Once you've calculated the tenon lengths from your test pieces, factor these measurements into the overall length of the rails. Then, cut all the legs and rails to finished size.

2 When laying out the mortises and tenons, transfer each measurement to all the pieces as you perform each step. For example, mark the tenon thickness on all the rails, then the setback distance.

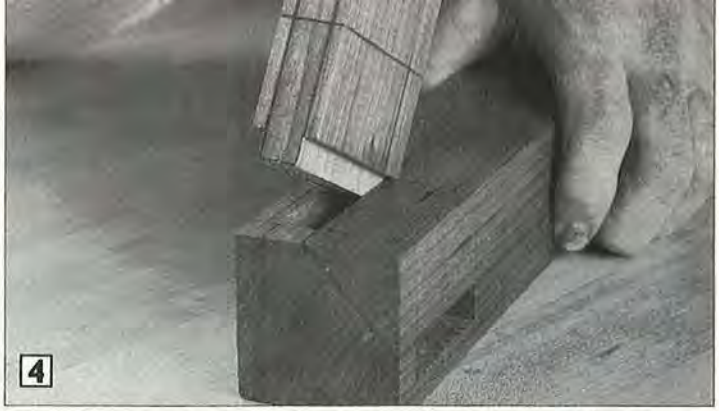
3 Arrange the legs and rails as shown in the Leg-Rail Assembly Sequence Sketch *at right*. Then, mark each for easy identification when you clamp and glue the assembly later. This will help keep you from getting the pieces mixed up, in case you have to "fine-tune" some of joints for a custom fit.

4 Each time you cut or drill one piece, do the other identical pieces at the same time. That way, you're not continually switching back and forth between tools and changing tool settings.

GLUING AND CLAMPING THE LEG-RAIL ASSEMBLY

Follow the sequence in the Leg-Rail Assembly Sequence Sketch to glue and clamp and glue the leg-rail assembly. Spread a liberal coat

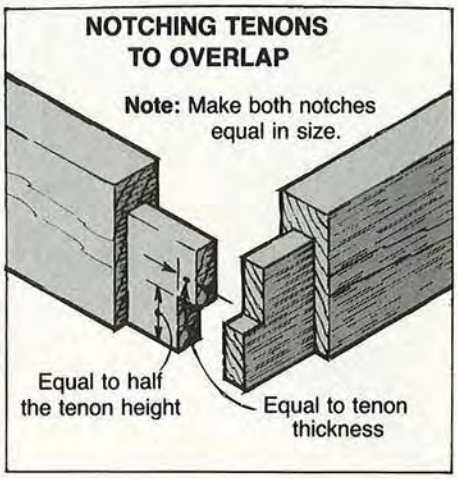
With a ¾" dado set, test-notch the tenon cheek.



Test-fit the tenon in the mortise; adjust the dado height, if necessary.

Cut the tenon cheeks, working from the tenon shoulder to the end.

Using the same notch-and-test method, cut the tenon setback.



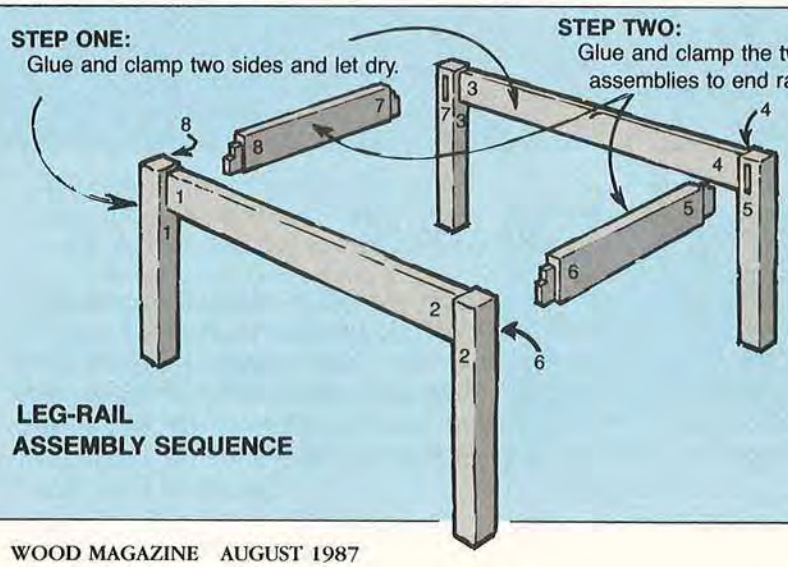
with the dado blade as shown in photo 3. (We attached an auxiliary fence to the miter gauge to steady the rail while cutting.)

2 Test-fit the tenon in the mortise (photo 4). If necessary, raise or lower the saw blade to adjust the thickness of the tenon. If the tenon is too thick, remove equal amounts of material from both sides. For example, if the tenon measures 1/16" thicker than the mortise width, raise the saw blade 1/32". Should the tenon be too thin, lower the saw blade and remove equal amounts of material from both sides.

3 With the blade height set, finish cutting the tenon cheeks (photo 5). Start at the shoulder and work toward the end. Don't worry about marks left by the blade — the tenon needn't be smooth.

4 Elevate the blade to the correct height for the tenon setback (photo 6). Use the same "notch and test" method as you did to cut the tenon shoulders in Step 2, then finish cutting the setback. Now, repeat Steps 1-4 to cut the tenon for the adjacent rail.

5 Lay out and cut the tenon notches so they'll overlap when fitted into the mortises. Follow the guidelines in the Notching Tenons To Overlap Sketch *above*. (We cut the notches on our band saw.) Now test-fit the tenons in the mortise. If the tenons fit only part way into the mortise, chisel excess material from the mortises until both tenons bottom out and fit snug.



LEG-RAIL ASSEMBLY SEQUENCE

of glue on the tenons and in the mortises. Tape the exposed areas around the joint to protect them from glue squeeze-out.

Now, clamp the frame sections together. While clamping, check frequently with a framing square to make sure the pieces remain square.

Produced with James Downing
Written by Jim Barrett
Photographs: Bob Calmer
Illustrations: Bill Zaun, Chuck Sterns

Burl-Topped

Print this article

Carpathian Elm Burl

One of the most stunning veneers available, Carpathian eml burl varies in color from brick-red to a light tan. It's cut from the wartlike burls of English elm grown in France, England, and the Carpathian Mountains. Highly figured and rare, you find it used in fine cabinetry and decorative areas in furniture. We also appreciate the workability of a flexible veneer compared to that of regular veneer.

Coffee Table

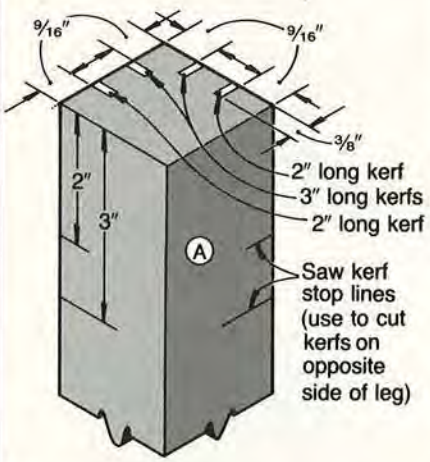
For a long time now we've been fascinated by the intricate beauty of Carpathian elm burl. It's exquisite, especially after the finish has been applied. So when we set out to select just the right wood for this coffee table's three veneered panels, it didn't take us long to settle on this show-stopping species.

Add to this, finely tapered legs with walnut-striped highlighting and solid mortise and notched-tenon construction, and you have all the elements for an extraordinary project.

START WITH THE LEGS

***Note:** You'll need thick stock for the table legs. You can either laminate thinner stock to size or purchase turning squares. See the Buying Guide on page 44 for our turning-square source.*

1 Cut four legs (A) to size from 2"-square stock. Using the drawing *below* as a guide, lay out the location of the four saw kerfs on one end of each leg. To ensure the kerfs are cut to the right length, mark kerf length reference lines opposite the faces in which the kerfs will be cut.

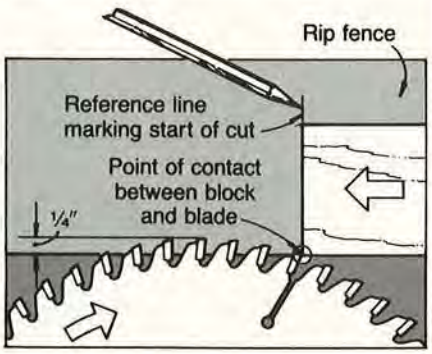


2 Adjust the rip fence on the table saw to cut the first kerf where marked, and raise the saw blade 1/4" above the surface of the saw table. With the saw turned off, slide a block of wood along the rip fence until it makes contact with the blade. Now, as shown in the sketch *at right*, make a mark on the inside face of the fence above this point of contact.

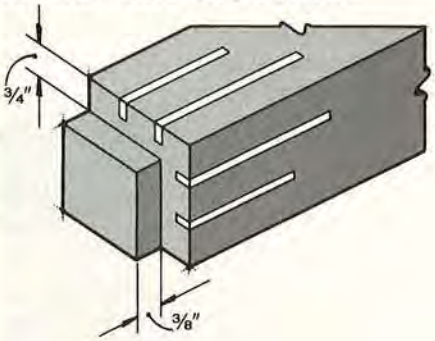
3 Clamp a stop to the rip fence 3" behind the marked line. Cut the first 3"-long kerf in each of the four legs as shown in the photo *below* (the inside cuts are 3" long and the outside cuts are 2" long). (You can use this setting for cutting *one* of the kerfs in *each* leg. You'll need to move the fence *three* more times to cut the remaining three kerfs in each leg.) Use the stop at the first setting for cutting two 3"-long kerfs in each of the legs. Reposition the stop 2" from the mark on the rip fence to cut the 2"-long kerfs.)

Cutting a kerf in the top end of the table leg on the table saw.

4 To make the decorative inserts, cut a 42"-long strip of walnut to 1/8" thick by 5/16" wide. From the strip, cut eight pieces 3" long and eight pieces 2" long. Sand one end of each walnut insert to match the contoured end of the saw kerfs in the legs where shown in the Kerf Detail on the Exploded-View Drawing on the next page. Glue the inserts in place and sand flush after the glue dries.

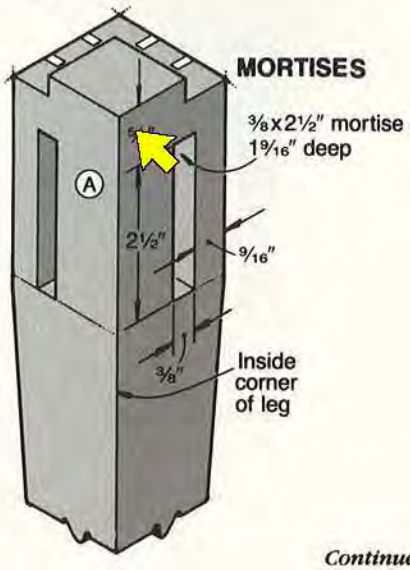


5 To cut rabbets on the top end of each leg, use a dado set to cut a 3/8" rabbet 3/4" deep on the *two kerfed* surfaces where shown *below*.



***Note:** Building the base requires mortise and tenon joinery. To learn more about leg-rail construction techniques, read the article on page 34.*

6 Mark the location of a pair of mortises on each leg, using the dimensions on the Mortises Drawing *below*. Drill 5/16" overlapping holes in the leg to rough-out the mortises. Then, chisel the mortises clean.



Continued

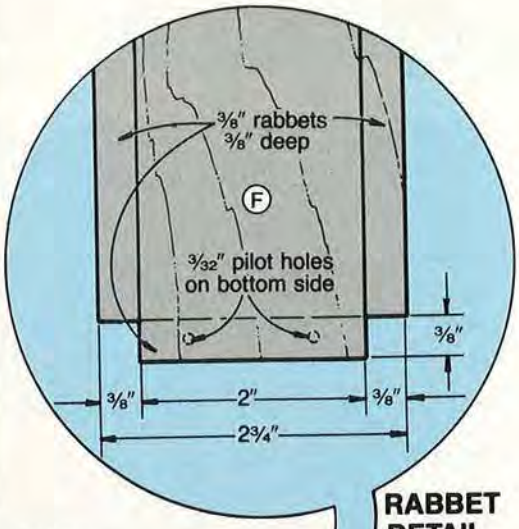
Coffee Table

Bill of Materials

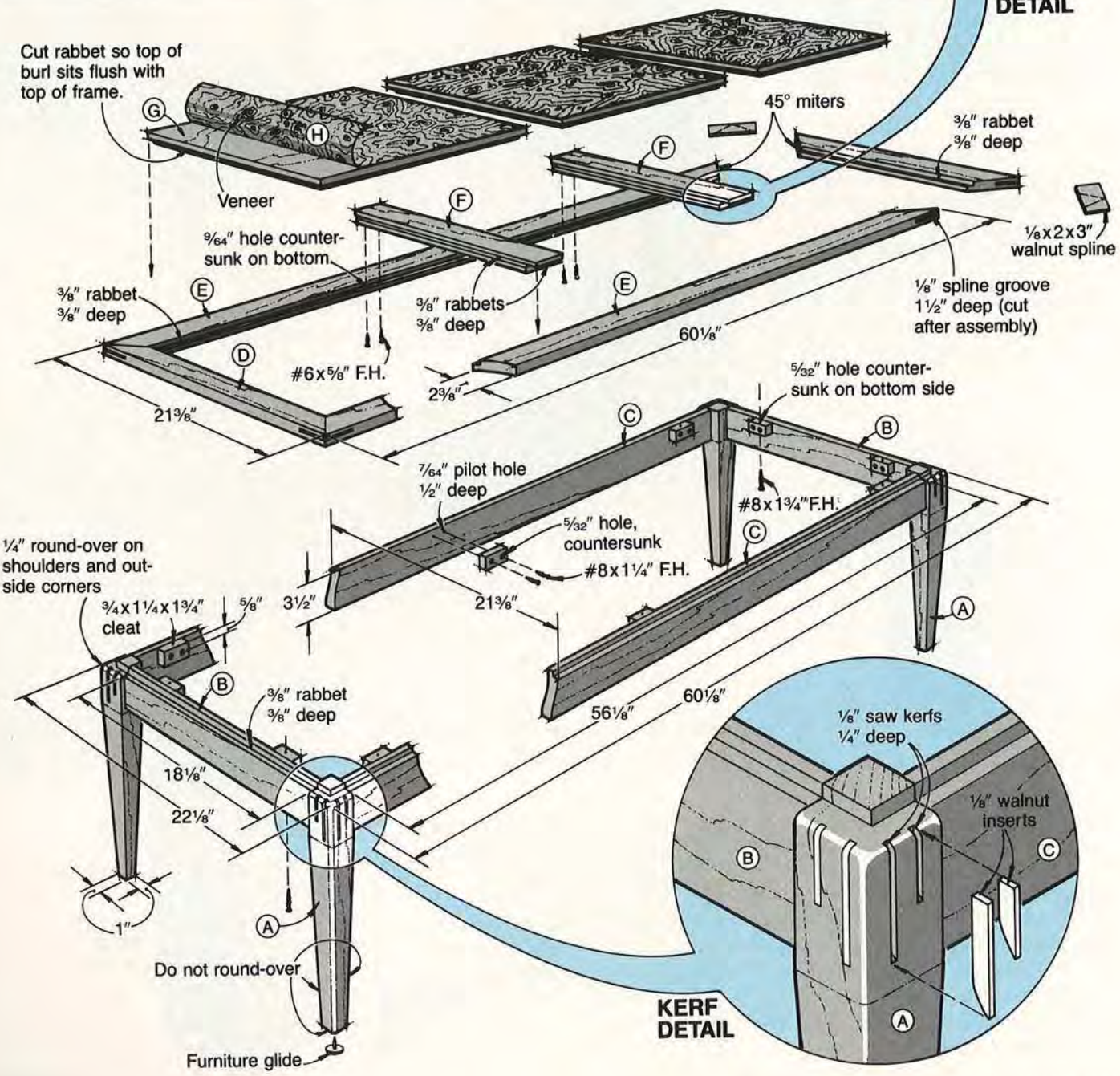
Part	Finished Size* T	W	L	Material	Qty.	Part	Finished Size* T	W	L	Material	Qty.
A	2"	2"	16"	red oak	4	E*	¾"	2⅜"	60⅛"	red oak	2
B	¾"	3½"	21⅛"	red oak	2	F*	¾"	2¾"	17⅜"	red oak	2
C	¾"	3½"	59⅛"	red oak	2	G*	¾"	17⅜"	17⅜"	AB plywood	3
D*	¾"	2⅜"	21⅜"	red oak	2	H*	1/64"	17⅜"	17⅜"	veneer	3

*Parts marked with an * are cut larger initially, and then trimmed to finished size. Please read the instructions before cutting.

Supplies: ⅛" walnut for decorative kerfs and splines, #6x⅝" flathead wood screws, #8x1¾" flathead wood screws, #8x1¼" flathead wood screws, polyurethane sanding sealer, polyurethane, 4 — furniture glides

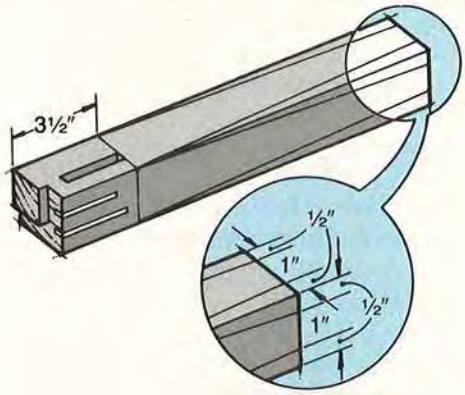


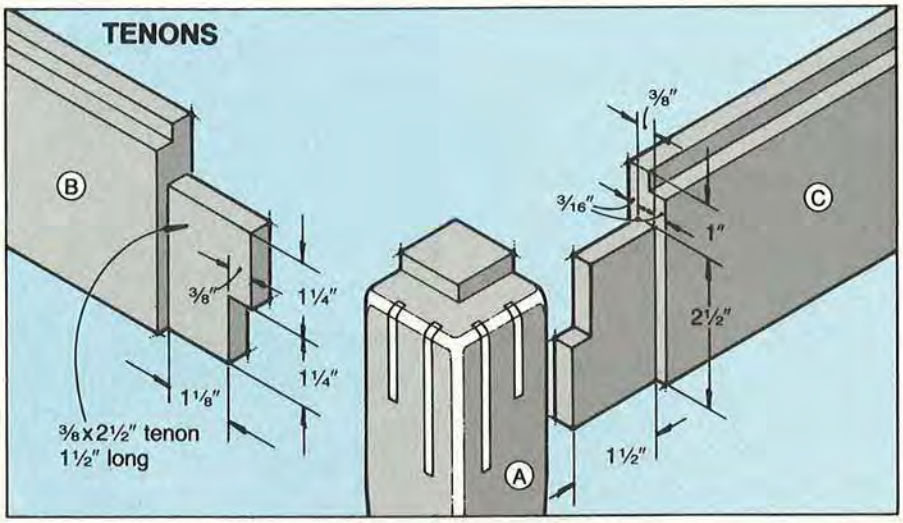
RABBET DETAIL



KERF DETAIL

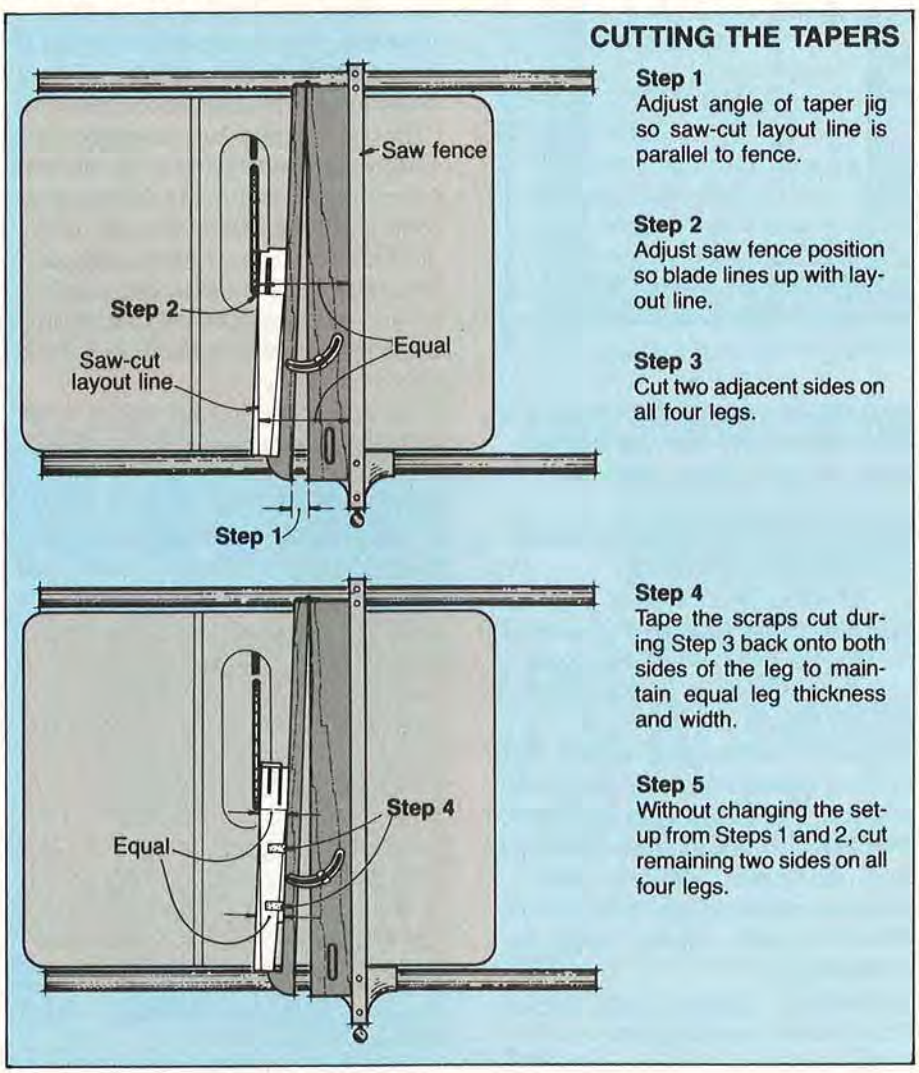
7 Now, using a straightedge, lay out and mark the leg tapers as dimensioned on the drawing *below*.





8 Using the taper jig shown on page 45, cut the tapered legs to shape, following the sequence noted in the drawings *below*. Sand each tapered leg smooth.

9 Mount a ¼" round-over bit to your table-mounted router. Rout along the outside corner and the two outside shoulders of each leg where shown in the Kerf Detail.



Step 1
Adjust angle of taper jig so saw-cut layout line is parallel to fence.

Step 2
Adjust saw fence position so blade lines up with layout line.

Step 3
Cut two adjacent sides on all four legs.

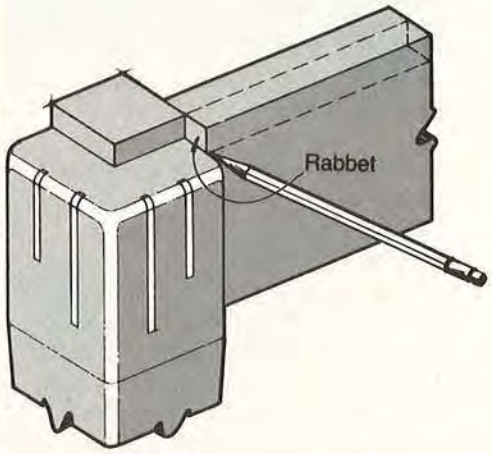
Step 4
Tape the scraps cut during Step 3 back onto both sides of the leg to maintain equal leg thickness and width.

Step 5
Without changing the setup from Steps 1 and 2, cut remaining two sides on all four legs.

NOW, ADD THE RAILS

1 Cut the end rails (B) and side rails (C) to size. Lay out and cut a ⅜x1½" long tenon on each end of each rail (see the Tenons Drawing *above* for the needed dimensions). Cut the top 1" off each tenon. Now, cut a ⅜" notch 1¼" long on the *top* end of each side rail and on the *bottom* end of each end rail.

2 Dry-clamp the rails to the legs, checking the fit of the tenons in the mortises. As shown on the drawing *below*, mark the size of the rabbet needed on the top outside edge of each rail. Cut or rout the rabbet to size along each rail.



3 Glue and clamp an end rail between two legs to form each end subassembly, and let dry. Later, glue and clamp the two side rails in position to form the table base, checking for square.

Continued

Coffee Table

MAKE THE TABLETOP FRAME

1 Cut the end rails (D), stiles (E), and center rails (F) to size *plus* 1" in length.

2 Cut or rout a ⅜" rabbet ⅜" deep along the top inside edge of the end rails and stiles and along both edges of each center rail where shown on the Exploded-View Drawing.

3 Miter-cut the end rails and stiles to length. Using a band clamp, dry-clamp the frame together to check the fit. Then, glue and clamp the frame together, checking for square.

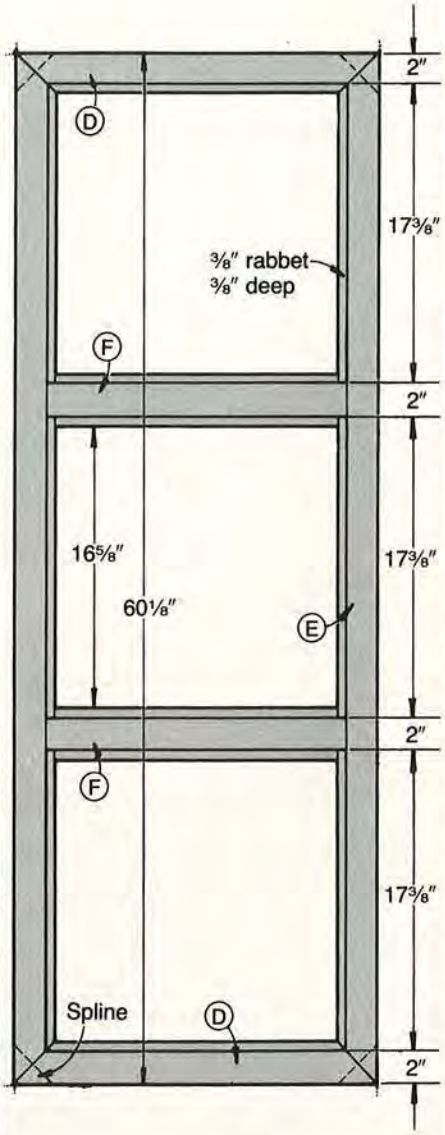
4 Using a V-block jig, cut a ⅛" spline groove 1½" deep centered on the frame as shown in the photo *below*. (We used two people because it's too hard for one person to support the frame and make the cut.)

Cutting the spline groove with a V-block jig and helper.

5 To form the splines, cut four pieces of ⅛" walnut to 2x3" long. Glue one piece in each corner groove. After the glue dries, trim off the excess, and sand smooth.

6 Cut the two center rails (F) to length to fit between the rabbets on the side stiles (E). Cut or rout a ⅜" rabbet ⅜" deep along the *bottom* of each center rail end.

7 Position the center rails between the stiles as dimensioned in the drawing *above right*. Check for square. Using the hole sizes shown on the Exploded-View-Drawing, drill holes through the *bottom* of the side stiles and ¼" into the *bottom* of the center rails. Glue and screw the rails in position. Sand the frame smooth.



NEXT, CUT AND LAMINATE THE PANEL INSERTS

1 Cut three pieces of ¾" plywood (G) and three pieces of veneer (H) to 18x18" (we used Carpathian elm burl veneer as listed in the Buying Guide.)

2 Spread veneer glue on one face of the plywood and the back side of the veneer, following the instructions on the veneer-glue can. Position one veneer panel on each piece of plywood and press it down flat with a veneer roller or a rolling pin.

3 *Carefully* measure *each* rabbeted-frame opening and cut the three plywood-veneer panels to size (we numbered the panels and frame openings to ensure matching them up later). Cut or rout a ⅜" rabbet on the *bottom* edge of each panel deep enough so the top surface of the veneer rests flush with or just a fraction *below* the surface of the oak frame.

4 Glue and clamp the panels in place. (We used clamp blocks with felt between the veneer and block to prevent marring the veneer.)

ADDING THE FINISHING TOUCHES

1 Finish-sand the base and top, being *extremely careful* not to sand through the thin veneer.

2 To attach the top to the base, start by ripping a strip of ¾" stock to 1¼" wide by 20" long. Cut ten 1¾"-long cleats from the strip. Drill and countersink holes where shown on the Exploded-View Drawing. Fasten the cleats to the base first, mounting them 1/16" *below* the top edge of the rails. (This allows you to tighten the top snugly against the top edge of the base.) Now, center the top on the base, and screw the top to the base.

3 Finish as desired. (We applied two coats of polyurethane sanding sealer, and then several coats of clear polyurethane, sanding lightly between coats.)

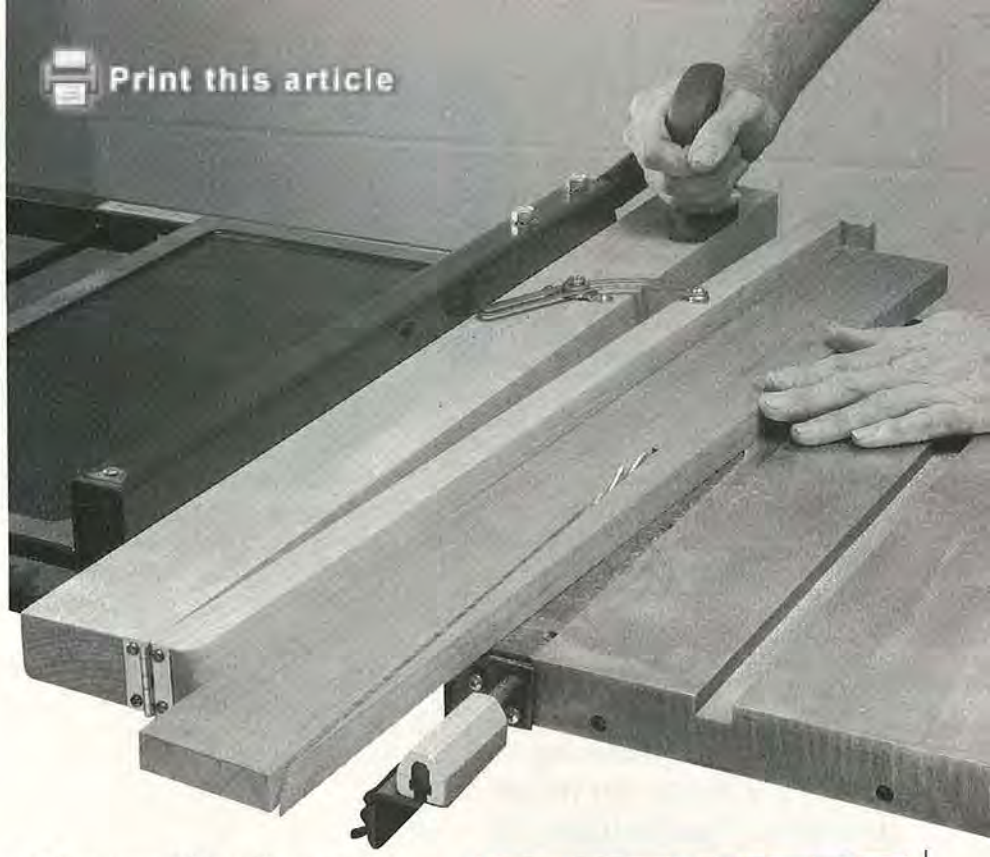
4 Attach the furniture glides, and call some friends over for coffee.

BUYING GUIDE

- **Carpathian elm burl.** Paper-backed flexible veneer, cuts straight and clean with a crafts knife, lays smooth and flat with veneer glue. 18x60" roll, $49.75 postage paid. Constantine, 2050 Eastchester Rd., Bronx, NY 10461 or call 800/223-8087 (800/822-1202 in NY) to order.
- **Veneer glue.** One pint of contact adhesive, catalog no. 12VGP, $5.25. Constantine, address above.
- **Red oak turning squares.** 2x2x18", $16 for four, postage paid. Constantine, address above.

Project Design: James R. Downing
Photographs: Bob Calmer
Illustrations: Kim Downing; Bill Zaun

True-cut TAPER JIG



Ripping table legs or other project pieces at an angle can be frustrating and even dangerous work. However, with our taper jig, you'll be able to quickly set the precise angle and safely cut leg after leg, with the first identical to the last.

BUILDING THE JIG

1 Using 1½" maple stock, cut the jig body (A) to 3x30" and the jig arm (B) to 1¾x30".

2 Drill a ¼" hole centered from side to side through the jig arm, 1¾" from one end. Starting at the end opposite the hole you just drilled, rip the jig arm on center, stopping 2" from the hole (the hole simply prevents sawdust buildup). Use a band saw or handsaw to cut to the hole, to form the notch shown on the drawing.

3 Cut a piece of 1" walnut stock to 3¼x4½" for the handle (C). Drill a ½" hole 1½" deep in it where shown in the Handle Grid. Using the grid as a guide, cut the handle to shape. Sand a round-over on all but the bottom edges.

4 Drill a ½" hole 1" deep in the jig body for mounting the handle. Cut a ½" dowel 2⅜" long and glue it into the handle. Now, spread glue on the dowel and on the bottom side of the handle, and glue the handle to the jig body. Sand the jig body, arm, and handle smooth, and apply the finish.

ADDING THE BRASS HARDWARE

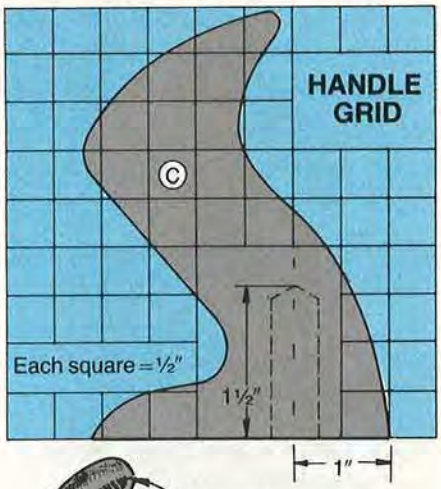
1 Clamp the jig arm to the jig body so that the front ends are flush. Position the hinge, mark the screw hole locations, drill pilot holes, and fasten the hinge to the jig arm and body.

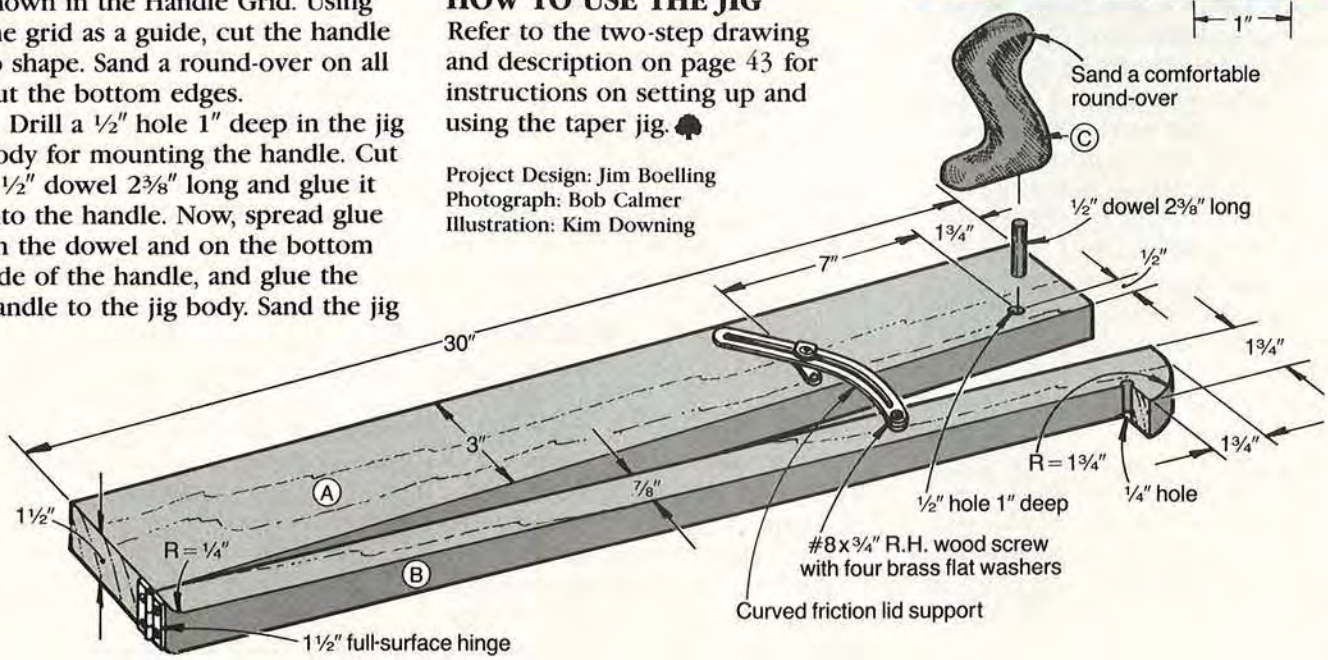
2 Mark the screw hole locations, drill pilot holes, and attach the lid support to the jig arm and the body.

HOW TO USE THE JIG

Refer to the two-step drawing and description on page 43 for instructions on setting up and using the taper jig.

Project Design: Jim Boelling
Photograph: Bob Calmer
Illustration: Kim Downing

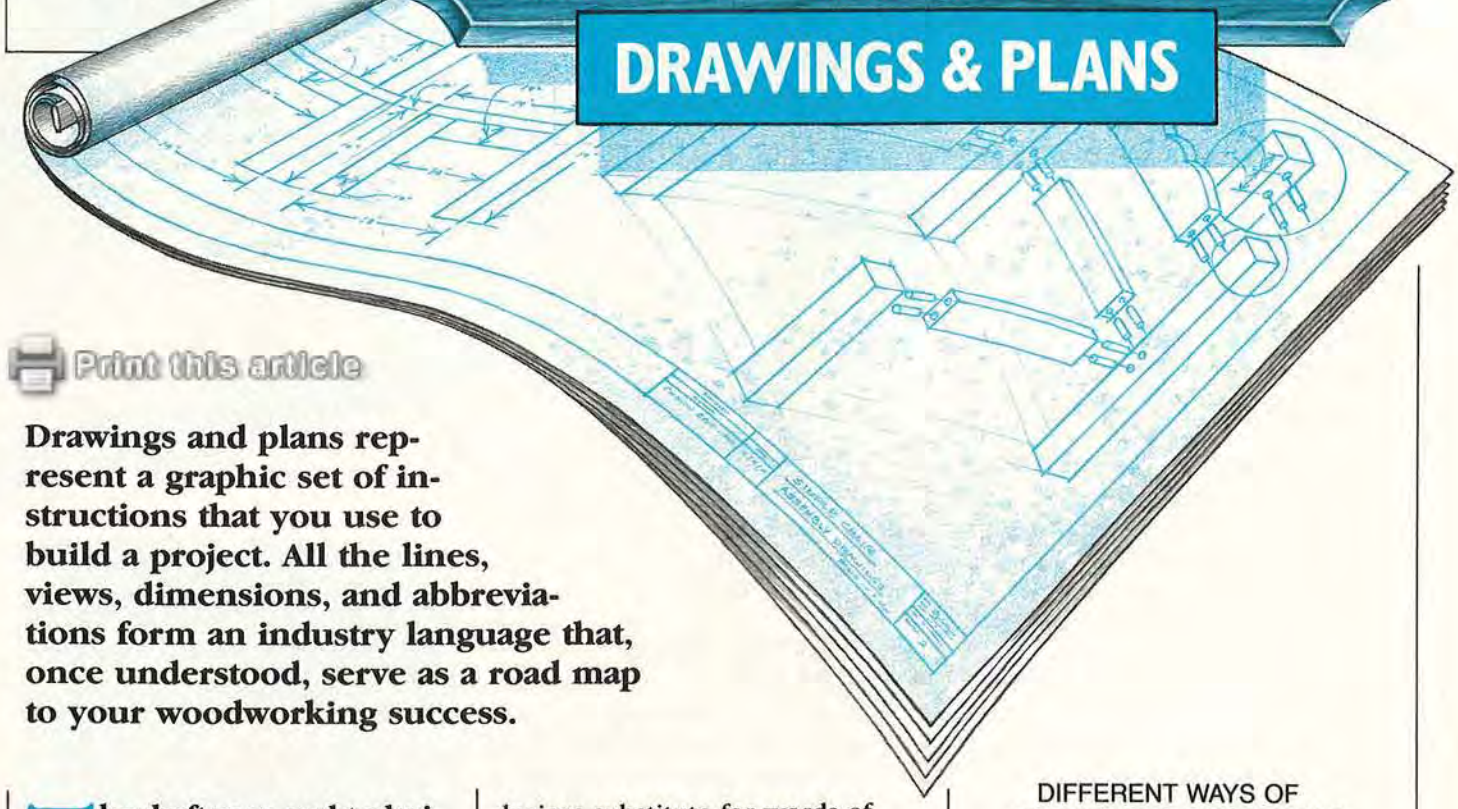




Previous articles in this series include "Seating" and "Tables", Feb., 1986, pp. 54-56, 61-63; "Screws", June, 1986, pp. 46-49; and "Kitchen Cabinets", Oct., 1986, pp. 64-67.

WOODWORKERS' STANDARDS

DRAWINGS & PLANS



Print this article

Drawings and plans represent a graphic set of instructions that you use to build a project. All the lines, views, dimensions, and abbreviations form an industry language that, once understood, serve as a road map to your woodworking success.

The draftsmen and technical illustrators who produce the project drawings and plans you see in *WOOD* magazine have a big job to do. Their task — to provide you with a plan that's clear, accurate, and complete enough for you to follow without confusion.

That's a chore. And even the best of their work still can be confusing if you don't fully understand their graphic language. Hopefully, the following information will clear up any questions you may have about this sometimes perplexing aspect of woodworking.

READING THE DRAFTSMAN'S SHORTHAND

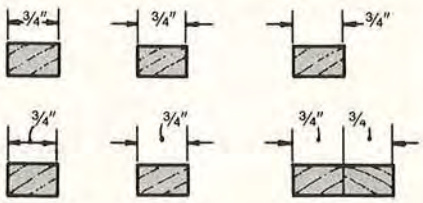
Theoretically, the drawings that illustrate a woodworking project should be all the instruction you need to build that project. The abbreviations, lines, symbols, numerals, arcs, and other graphic devices substitute for words of step-by-step how-to. The trouble is, many of us haven't been schooled to understand this special draftsman's language. See the box *below* for commonly used abbreviations and what they mean.

DRAFTING ABBREVIATIONS

O.C. = On center
C.C. = Center to center
W/ = With
W/O = Without
I.D. = Inside diameter
O.D. = Outside diameter
O.A. = Overall
~ = Approximately
±1/4" = 1/4" tolerance either way
℄ = Centerline
TYP. = Typical (PARTS THE SAME)
∠ = Angle
F.H.W.S. = Flat head wood screw
R.H.W.S. = Round head wood screw

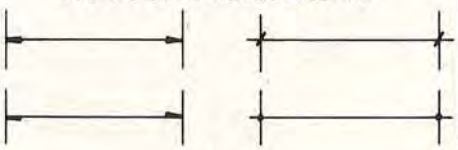
Dimensions rate as the most important element in any drawing. The sketch, *above right,* shows the many ways draftsmen present dimensions on their drawings.

DIFFERENT WAYS OF PRESENTING DIMENSIONS



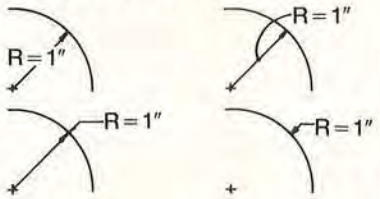
Available space usually determines where the dimension numbers fall — within the line, outside the line, or away from it with an indicator called a *leader.* There's another style variable you should know about, too. Those little delineators on the ends of dimension lines can assume several shapes, as shown *below.*

TYPES OF DELINEATIONS

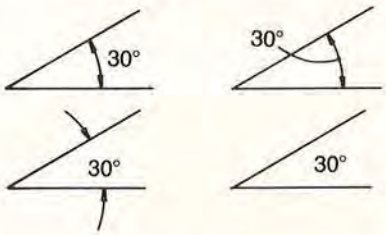


But, regardless of the symbol — arrowhead, half-arrow, slash, or dot — they all indicate the distance between two points.

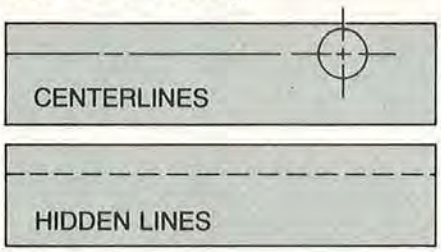
INDICATING RADIUS

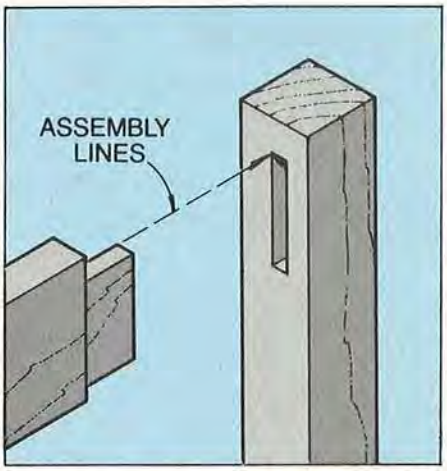


CALLING OUT ANGLES



Radii and *angles,* shown *above,* also appear in different forms, depending on the draftsman doing the work. Generally, he or she will use a consistent style, at least within the same drawing.



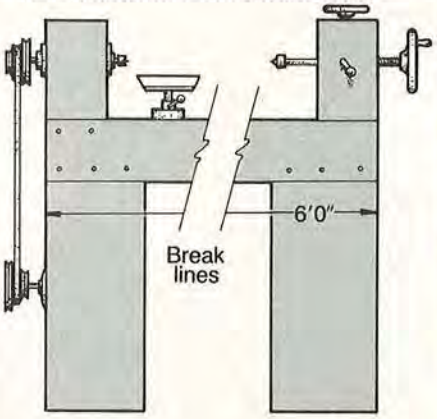


Center lines mark the middle of parts and the hub of circles, usually to aid in your dimensioning. As you can see, *above,* they differ from *hidden lines,* which bring to your attention those surfaces, edges, or corners of a part that lie directly behind the part you're viewing. Often, you'll be able to see these parts clearly in another drawing on the plan.

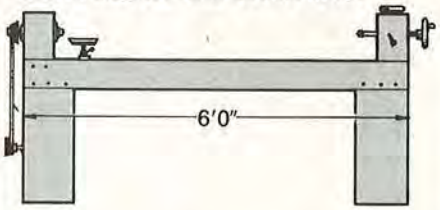
Assembly lines show you the relationship of one part to another in the completed object, such as a tenon that fits into a mortise, an arrow indicates the direction of part movement.

Break lines, illustrated in the lathe drawings, *below,* represent another often-confused or misunderstood aspect of draftsman's shorthand. By actually abbreviating

Lathe shown with break lines



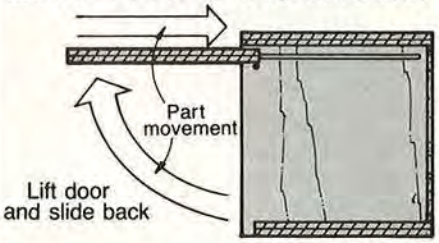
Lathe shown w/o break lines



the illustration, they condense the view of long, uniform sections or parts. Break lines allow a draftsman to show you much greater detail in a drawing that takes up the same amount of space. But, just so you always keep the whole object in mind, you'll always find total length dimensions used in conjunction with break lines.

The thick, curved arrows used in the storage unit section view *above right,* signal *part movement.* Where arrows used by themselves might not explain enough, the draftsman will ink in a few brief words of explanation. In our example, the arrows show you which way the cabinet door swings, and the words help you get the picture.

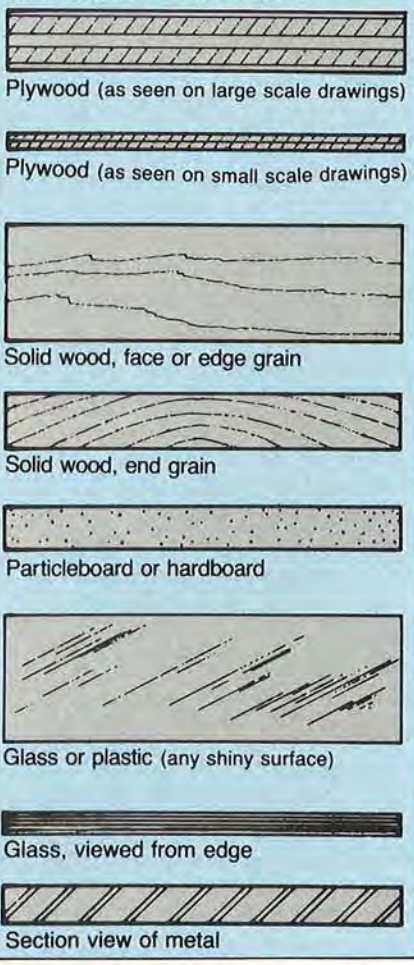
SECTION VIEW OF STORAGE UNIT



SYMBOLS THAT IDENTIFY MATERIALS USED IN THE PROJECT

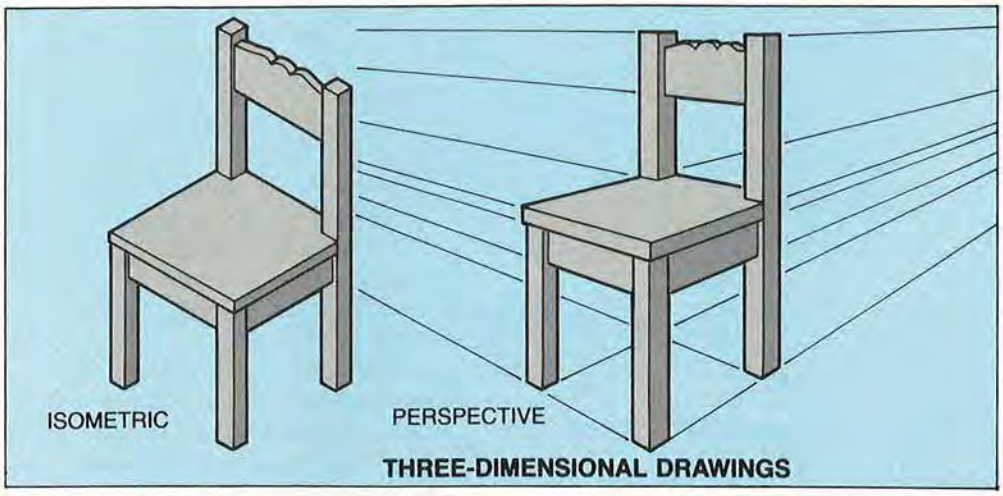
Architectural drafting, the kind used for woodworking projects, employs a variety of symbols to represent *materials.* In most woodworking drawings and plans, however, you usually need to recognize only solid wood stock, plywood, composition board, and the other materials shown *below.*

COMMON WOODWORKING MATERIALS SYMBOLS


Plywood (as seen on large scale drawings)
Plywood (as seen on small scale drawings)
Solid wood, face or edge grain
Solid wood, end grain
Particleboard or hardboard
Glass or plastic (any shiny surface)
Glass, viewed from edge
Section view of metal

Continued

Should grain direction be important to the design or construction of the project, you'll see it sketched in as on the illustration for solid wood stock. If critically important to the project's structure, the draftsman will include a notation saying "grain direction" with an appropriate directional arrow. End grain, where it's necessary to be indicated, looks just like the end of a board.



THREE-DIMENSIONAL DRAWINGS

PICTURES WORTH A THOUSAND WORDS

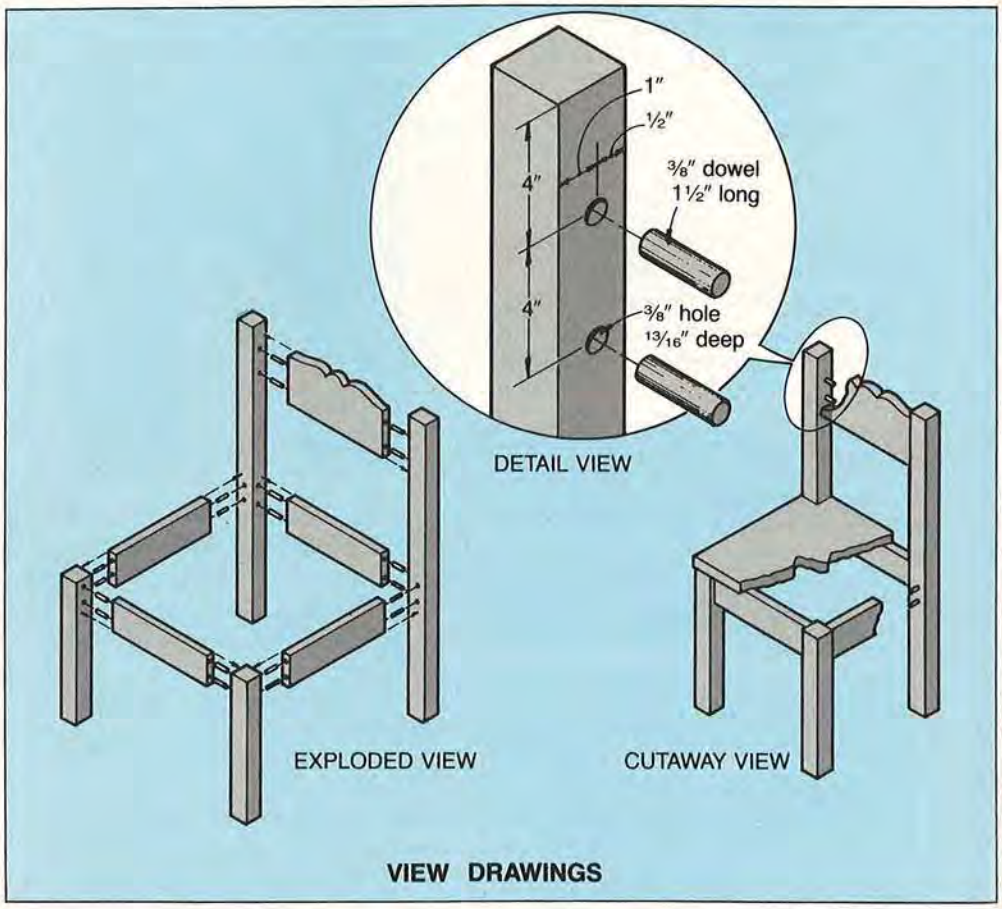
Your eyes see objects in three dimensions — height, width, and depth. When a draftsman attempts to duplicate what your eyes see, he draws an object *pictorially,* using either *isometric* or *perspective* techniques, as shown *above right.*

You'll most often see isometric drawings on project plans. These pictorial drawings make the object on the paper look three-dimensional. If an isometric drawing is done to scale, you could take measurements from it because all parallel lines remain parallel. In perspective, the parallel lines seem to converge at a distant point, like looking down railroad tracks to the horizon. However, most magazine drawings are done in perspective. Therefore, you should rely on the dimensions shown. If you find dimensions missing, check the bill of materials.

Draftsmen employ three other pictorial techniques, shown *right,* to help you understand a project. The *exploded view* or *assembly drawing* separates the parts.

Many projects are too complicated or have too many parts to be shown with just an exploded view. So, draftsmen sometimes use a *cutaway* view with all the parts intact but some material "cut away" to reveal hidden details.

If necessary, the draftsman will add *detail* drawings to provide you with an enlargement of a specific part or aspect of joinery that otherwise would be difficult to see or comprehend. Actually, exploded, cutaway, and detail views have inherent strengths and weaknesses in the illustration of assembly. That's why they're often used in connection with each other.

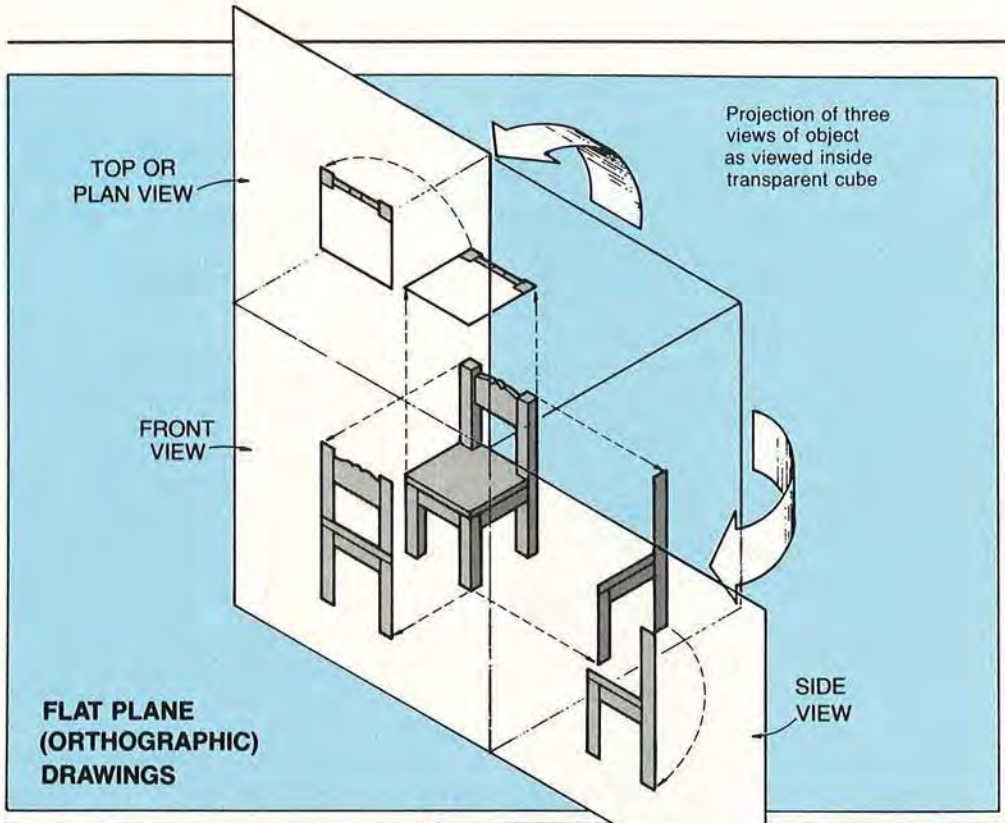


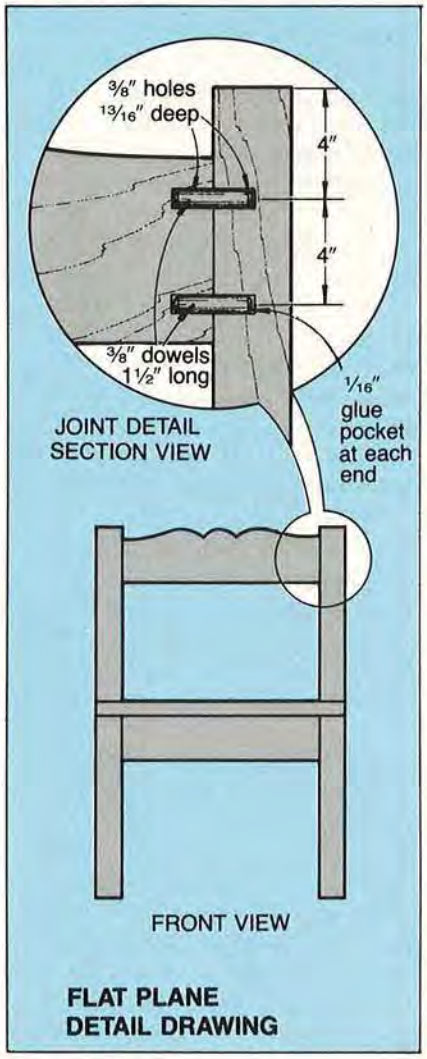
VIEW DRAWINGS

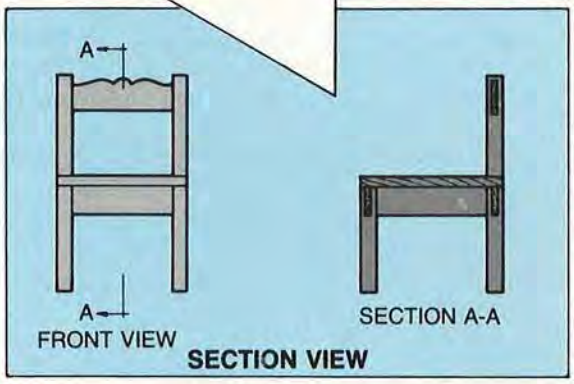
FLAT-PLANE DRAWINGS DO AWAY WITH THE THIRD DIMENSION

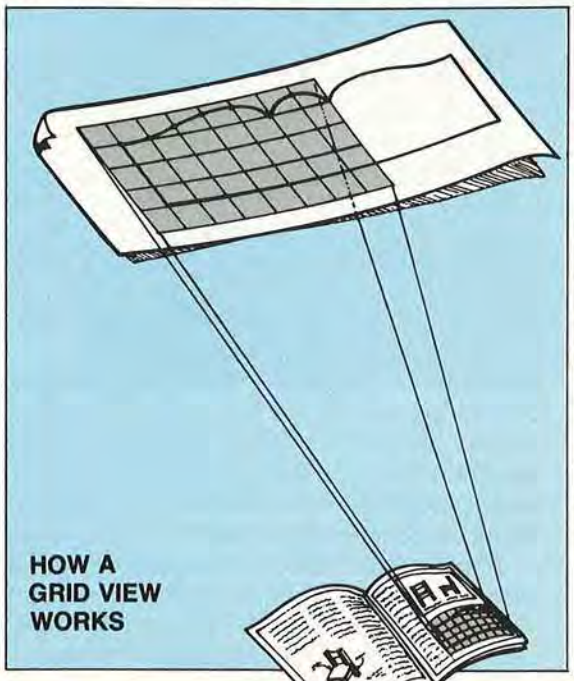
Three-dimensional project drawings may look more realistic to you, but for simple, easy to read, easy to transfer dimensions, draftsmen rely on the *orthographic* or *flat-plane* approach.

In flat-plane drawings, you look at the project straight on — usually from the front, the top (sometimes called a *plan* view), or the side. The illustration, *above right,* shows you how a draftsman would mentally take a three-dimensional object apart for each view.









A *section* view, shown *below left,* provides a peek into a project's interior along a single, identified plane, as if the project were sawn in half down that line. By visually sawing it in half, you can see the relationship between the parts in the finished project.

The vertical lines on the front view drawing identify the cut plane from where the view (section A-A) was taken. The short lines with arrowheads indicate the direction you're looking when viewing the section. Section views always show details too complex to depict with hidden lines.

You also can find detail views drawn in the flat plane, *below far left.* They give you an enlargement of a part, or joinery, that otherwise would be difficult to understand. Dimensions, arrows, and instructions or descriptions support the illustration as necessary.

PROJECT PATTERNS FOR YOU TO COPY

On a project plan, designs or parts with irregular lines, such as a relief carving or a curved chair back, show up drawn as patterns. You can copy *full-size* patterns without reduction or enlargement. But, unfortunately, books and magazines usually can't devote the space needed for full-size patterns, unless the part or design happens to be very small. So, draftsmen use less-than-actual-size patterns called *grid views, below left.*

Drawn on a grid of squares, with each square representing a full-size area, the pattern must be enlarged for you to use it. You'll find the amount of enlargement given as a scale, such as "Each square = 1″." That simply means that you should draw the pattern on paper with 1″ squares for faithful reproduction. When a part has two identical halves, only a grid for half the part will be shown, as with the chair back illustrated. You draw the grid view, then cut it out and flip it over for the other half of the part.

Produced by James R. Downing and Peter J. Stephano
Drawings: Bill Zaun

How about starting A TOOL COLLECTION?

Print this article

It's fun, fascinating, and, occasionally, even profitable!

Old tools can be worth big bucks. Yet, money isn't the draw for most collectors. Here's why some people collect and the advice to get you started.

Norman, Oklahoma, tool collector Don Baker still can't get over a "find" he came across a few years ago. "I was poking through a flea market table when I spied a spring-jaw trap used by trappers to take pelts. 'How much?' I asked. 'Four bucks.' That trap was made of hand-forged steel and dates to about 1770. It's worth $1,000, but I wouldn't sell it." Don thrills at "The Hunt" and the story of how each tool was acquired is as important as the tools.

Bob Stanley, an air-traffic controller from De Ridder, Louisiana, collects old wooden levels. Part of his valuable collection he keeps in a bank vault, but Bob says the value's not important. "It's the challenge in trying to find this stuff."

The Hunt ranks right at the top among reasons why people collect old tools as a hobby, but there are plenty of others:

- An education in the history of yesteryear's skills and trades, and an interest in preserving it.
- The beauty, quality of materials, and craftsmanship in old tools.
- Satisfaction in seeking and finding the rare and unique, and the pride from building a collection.
- Investment. The value of collectible tools has increased as much as 35 percent a year, and usually returns more on investment annually than traditional savings plans.

What makes a tool collectible?

Some old tools have a real, intrinsic value. They were made with or contain precious or semiprecious metal, or have parts of now-rare, exotic wood.

Most tools, however, become collectible because someone attaches a special significance to them. A tool may represent a skill or technique not found today. Perhaps only a few of a certain type tool were manufactured; or, many may have been made, but few survive. Tools made by once-famous manufacturers no longer around also become collectible. So do early models or variations of now-common tools, mainly due to their quality of material and manufacture. In fact, think of a justification and that's reason enough to make it collectible.

Tool collecting dollars and sense

Unlike coins, stamps, and antique furniture, there's no concrete price guide for old tools, say veteran collectors. The market, made up of what individual collectors are willing to pay, sets the price for any tool. Advises Bob Stanley: "Beginning collectors should go to tool collectors' shows and look around to get a feel for what tools go for."

How does a beginning collector keep from being "taken"? Don Baker recommends buying tools only from another collector or reputable dealer. "Save the money you'd spend on junk tools and pay the price for a good one. It's better to have a real nice old tool than 10 'dogs' for the same price." Bob Stanley agrees: "If you pay $4.50 for, say, an old, dirty plane, figuring to clean it up, guess what? Afterward, you'll still have a $4.50 plane, although a clean one."

Yet, there is a direct relationship between a tool's condition and its dollar value. For instance, you can bet that almost *any* tool manufactured before 1960 and still in new condition with its original box has prime collector value. Bob, the level collector, admits owning two of one particular model: "One is a little beat, the other is like new in the box it came in. The first one's worth $40, the better one will bring $400."

Any tool worth adding to your collection should have its original parts, or at least replacement parts of the same vintage. And tools that can still be used will be worth more than those that can't.

Deciding what to collect

The narrower the field, the more manageable the hobby, the easier to stay within a budget, and the less space you need for display. But lots of collectors don't realize this right away.

"I started out with whatever happened to catch my eye," says Bob. "Then, after three or four years, I realized it should be levels."

"My criteria," notes Don, "no matter what the tool, is that it has to be usable. I'm going to build a cabin with my axes and adzes."

So what will you collect? Pick a trade, skill, or type of tool that piques your interest right off, even to fine-focusing your collecting on "brand new" old tools in original boxes. Then again, you don't have to decide right away. You can trade your early tools away later.

Where to look for tools

If you're embarking on the tool collecting trail for the first time, you're going to have to place some faith in others until you gain confidence in your knowledge.

- *Antiques dealers.* Find one or two local ones who deal, at least in part, in collectible tools. Then, ask lots of questions.

Digging through a tool display at a flea market often turns up bargains. Some collectible-tool dealers regularly exhibit at this type of sale.

Always make your interest known to other collectors you meet. They can become your most valuable sources for trading.

- *Collector clubs.* Meetings present great opportunities to make additions to your collection, since clubs usually hold a tool sale, swap, or auction. Members serve as sources for reams of information, and become contacts.
- *Tool auctions.* Your best sources are the pure tool auctions, if you can attend them. If time and travel become a problem, you can submit an absentee bid, or participate in a mail auction of tools.

The mail auction rates superior to entering absentee bids in the standard auctions because you'll find tool descriptions much more detailed, and the auctioneer normally guarantees satisfaction.

- *Flea markets, estate, rummage, and garage sales.* These rate as unpredictable sources, and you really have to know what to look for, but good buys are possible. Some dealers in old tools regularly participate in particular flea markets, and they should never be overlooked. Most of your real finds, however, will develop because you recognized a bargain.
- *Classified ads.* You can increase your potential sources by placing advertisements in local papers and those that circulate among other collectors and antiques dealers.

Record your collection

Keep accurate records of your collection for tax and insurance purposes. Start off on the right foot by recording notes regarding every tool's date of acquisition, where or from whom you acquired it, and how much it cost. Add any information you have about the manufacturer or other unique facts.

Your own home library will also be essential to collecting. Initially, buy some of the general references and price guides. In addition, it's usually a good idea to subscribe to mail order tool lists to keep up with prices. Few periodicals deal exclusively with tools. However, tool collecting groups publish quarterly newsletters that contain much information.

See *Sources and Resources for the Tool Collector*, page 88.

Produced by Peter J. Stephano with Vernon U. Ward
Photograph: Ralph H. Briggs

READERS, IT'S YOUR TURN!

PROJECT

Woodworkers enjoy the versatility of their material. Here's proof...from the hands of four more of our readers.

RACHEL'S FIRST TOY BOX – WITH LOVE FROM GRANDPA

Jim Dupont, 52
Woodburn, Ind.
High school woodworking teacher

To what lengths will a grandpa-to-be go for his firstborn grandchild? For Jim, it was a cherry toy box with delightfully carved basswood inserts.

"I was just going to carve something simple on top, but the more I worked on it, the more detailed and fanciful I made it," confesses this craftsman. Filled with enthusiasm about how his relief work was turning out, Jim went on to complete a multicharacter, Disney-like carving in basswood on the front of the box. Encouraged, he carved more characters on the ends, then stained the basswood panels to match the cherry.

Jim assembled the 20x24x40" box of ¾" material with tongue-and-groove lap joints and lined it with ⅜" cedar paneling. He made all the trim pieces with the help of his router. To protect little fingers, Jim joined the top to the back with tension support hinges. They hold the top in any position so it won't slam shut. An antique oil finish over the stain gives the project a mellow glow and highlights the carvings detail.

Rachel, we think, will enjoy putting away her toys.

SECOND RHAPSODY IN MAPLE

Peter H. Andrews, 25
Lancaster, Calif.
Janitorial service owner

Peter made his first harp from plans. The harmonious design for this one, his second, was scored from his imagination. Featuring bird's-eye maple sides, maple forearm and upper bowed arm, and padauk front and back, the harp was made to sit on the musician's lap, resting against the shoulder. Its height at the forearm measures 33", from forearm to back 20", and across the front, 12".

He had to balance the precision of building a musical instrument with his creativity. "I found that you can range quite a bit in the harmonic curve of the upper arm," he says, "but the dimensions of the tuning pins must be precise."

Using a band saw, Peter fashioned the upper arm with less curve than the traditional. He also made another modification. On most harps you'll find the tuning pins at the top of the bowed arm. Peter located his on the lower side of the arm, recessing them so that the strings would be as vertical as possible. "I measured the distance between the 29 pins with trammel points, then marked the holes below with a plumb bob and line," he explains.

To join the parts, Peter countersunk screws, then covered them with flush plugs of padauk. He hand-carved the rosettes from maple and padauk. Following lots of sanding with progressively finer garnet paper, he finished the harp with tung oil.

We understand Peter spends so much time making harps he hasn't learned to play one yet. Come on, Peter, haven't you heard about "all work and no play..."?

Print this article

SHOWCASE

A JIM-DANDY JEEP MADE DANDIER

Meredith Stedman, 58
Rochester, N.Y.
Electrician, retired

For his cherry and black walnut jeep, Meredith followed the basic design that appeared in *WOOD* magazine, December, 1985, p. 64. But he outfitted it with lots of first-rate options and a real handy accessory.

Meredith wanted to add utility to the four-wheeling vehicle for a very special recipient — his six-year-old grandson. The result — a trailer made of cherry that connects to the jeep with a removable peg so the junior driver can unhitch. Meredith even detailed it with dowel plugs for stop- and taillights.

Besides unhitching the trailer, the new owner can disassemble other parts, too. In fact, the whole vehicle comes apart easily for the routine "maintenance" or major "overhauls" that youngsters always want to tackle.

"For tough going around the home place," Meredith muses, "I outfitted the jeep with heavy-duty walnut bumpers, attached front and rear with dowels. A black walnut bumper on the trailer cushions any precious cargo being hauled from rear impact."

He improved on the pine wheels in the original plan, too. Meredith's jeep sports black walnut wheels he first turned on his lath, then crosscut to thickness. Then he added cherry plugs he bought for classy hubcaps. He also dressed up the simple, bored headlight holes on the published plan with ½″ plugs. To take abuse — and what jeep doesn't — this grandfather finished it with polyurethane.

Meredith, your jeep is a real jim-dandy any little boy would be proud to own!

A CLOCK THAT WAS A BLAST TO MAKE

Ralph R. Parshen, 58
Pine Bluff, Ark.
Electrical engineer

I bought a hot-shot set of carving tools made in Switzerland, and like most people, I had to use them right away. I wanted to do something big in relief with those magical new tools," says Ralph, "so I tested them on the clock, my very first carving."

Ralph sawed the 12-sided clock to shape from a 2″-thick pine block, then went at it with his new tools. According to Ralph, when he was finished carving, it looked like a "school arts and crafts project." That's when he decided to give sandblasting a try. After covering the surrounding rim with masking tape, Ralph sandblasted the 12″-diameter face under 90 psi of pressure in a setup at work.

"Pine has resin in it, so it has soft spots and hard spots," he explains. "So the soft spots wore away faster than the hard, creating an interesting textured effect."

Once satisfied with his creation, Ralph applied a light walnut stain, followed by several coats of satin lacquer. He installed the battery-operated movement in a recess he bored in the back.

Ralph may be onto something.

To submit your projects...

Send a 35-mm color slide *only* (no prints) with the project as the focal point and a simple background—no people. Include a capsule description—materials, joinery, finish, and dimensions, for example. *WOOD* will pay $25 for published projects. Slides cannot be returned unless you enclose a self-addressed, stamped envelope.

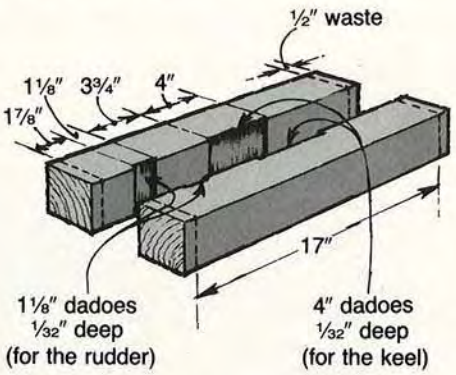
Project Showcase
Better Homes and Gardens®
***WOOD* Magazine**
Locust at 17th
Des Moines, IA 50336

AMERICA'S CUP

Our Rendition of a 12-Meter Racing Yacht

LAYING OUT THE HULL

1 Joint all four edges of a piece of B-grade balsa (check your local hobby store or see our Buying Guide on page 57) measuring 3x3x36" until the edges are square with each other. Crosscut the stock in half.



2 Position and clamp the two pieces side by side. (We used a scrap block under each clamp head to prevent denting the soft balsa.) Now, using the drawing *above* as a guide, mark the location of the 4" dado for the keel. Next, mark the 1⅛" dado for the rudder, and the scrap ends on both pieces. (Leave a bit of scrap at each end for trimming to length later.)

3 Cut the dadoes 1/32" deep where marked in each piece as shown in the photo *below*.

Cutting the keel and rudder dadoes with a radial arm saw.

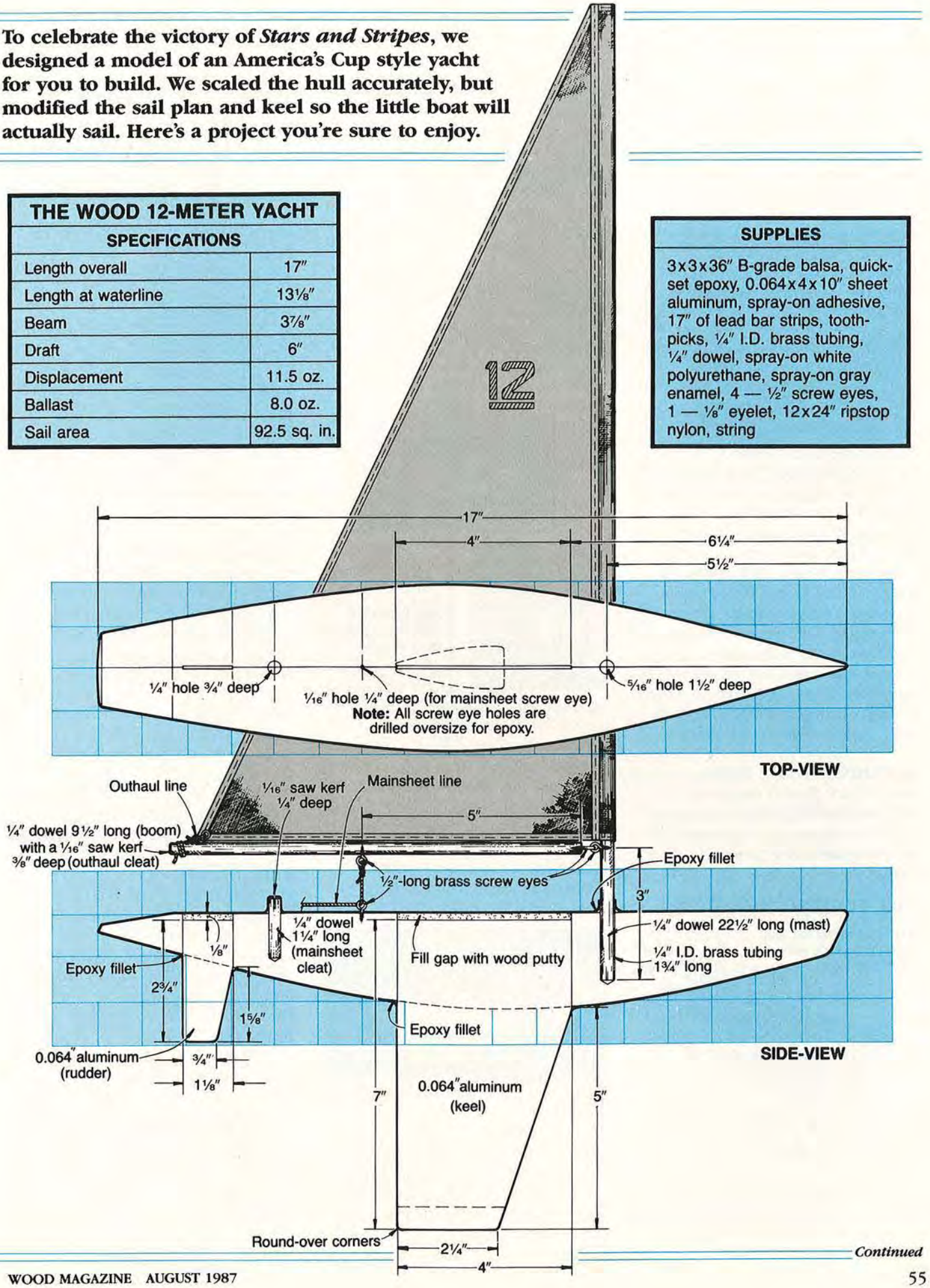
4 Using epoxy, laminate the two hull pieces together making sure the dadoes face each other and align. Later, trim each end of the lamination where marked for a 17" finished length.

To celebrate the victory of *Stars and Stripes*, we designed a model of an America's Cup style yacht for you to build. We scaled the hull accurately, but modified the sail plan and keel so the little boat will actually sail. Here's a project you're sure to enjoy.

THE WOOD 12-METER YACHT	
SPECIFICATIONS	
Length overall	17"
Length at waterline	13⅛"
Beam	3⅞"
Draft	6"
Displacement	11.5 oz.
Ballast	8.0 oz.
Sail area	92.5 sq. in.

SUPPLIES

3x3x36" B-grade balsa, quick-set epoxy, 0.064x4x10" sheet aluminum, spray-on adhesive, 17" of lead bar strips, toothpicks, ¼" I.D. brass tubing, ¼" dowel, spray-on white polyurethane, spray-on gray enamel, 4 — ½" screw eyes, 1 — ⅛" eyelet, 12x24" ripstop nylon, string



Continued

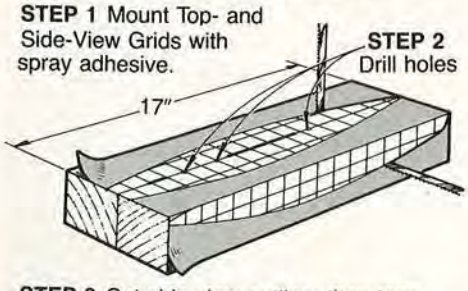
5 Draw two 1" grids measuring 4x19". Using the Side-View Grid for reference, lay out the shape of the hull side on one of the grids. To do this, mark the points where the outline crosses each grid line. Then, draw smooth curves to connect the points. Cut the just-drawn side-view outline to shape.
6 Fold the Top-View Grid in half along the *centerline*, and lay out one side of the hull top, using the Top-View Grid as your reference. With the grid still folded, cut along the marked line to cut the top-view outline to shape.
7 Unfold the top grid, and mark the mast hole, mainsheet cleat-dowel hole, and mainsheet screw-eye hole onto the gridded paper, again referring to the Top-View Grid for their locations.
8 Spray the back side of the top-view outline with spray adhesive. Carefully position it on the balsa where shown in the Hull Forming Sequence Drawing, lining up the center grid line with the lamination line on the balsa block.

Repeat this process with the side-view outline, making sure that the top of the outline aligns flush with the top edge of the balsa.

MACHINING THE HULL

***Note:** You'll find it helpful to use the Hull Forming Sequence Drawing* below right *as a reference during the machining operation in this section.*

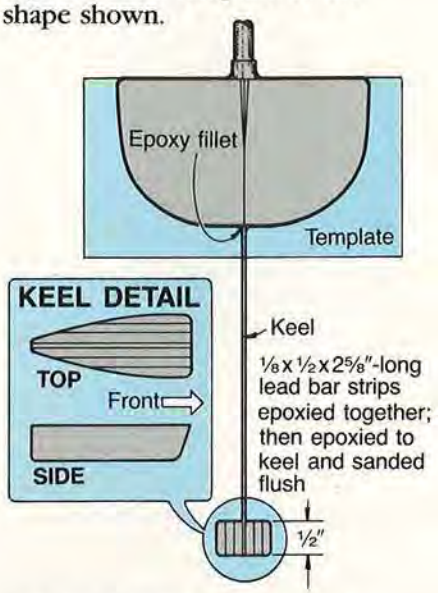
HULL FORMING SEQUENCE



STEP 3 Cut side-view outline; then tape bottom- and top-rear piece back on.

STEP 4 Cut top-view outline to shape.

1 With a drill press, drill a 5/16" hole 1½" deep for the mast, and a ¼" hole ¾" deep for the mainsheet cleat. Then, drill a 1/16" hole ¼" deep into the deck for the mainsheet screw eye.
2 Now, saw the side view of the hull to shape on a band saw. Tape the three pieces (two main pieces and a smaller top rear piece) back together. Saw the top view of the hull to shape.
3 Using a sanding block and 100-grit sandpaper, sand the band-sawn surfaces smooth.
4 Using the drawing *below* as a guide, cut a template to the shape shown.



Using smooth strokes, and checking the middle section against the template, plane the hull to shape as shown in the photo *below*. (*Don't* plane the front and rear 3" of the hull; you'll sand these sections to shape in the next step.)

Planing the balsa hull to shape with a hand plane.

5 Sand the hull to finished shape using 100-grit sandpaper. Be careful not to sand the front and rear sections too thin. Finish-sand the surfaces of the hull with 150-, 220-, and 420-grit paper.

HERE'S HOW TO MAKE THE KEEL AND RUDDER

1 Cut the keel to shape from 0.064" sheet aluminum, using the dimensions on the Side-View Grid on page 55 as reference. (We cut ours on the band saw fitted with a metal-cutting blade). Sand the cut edges smooth.
2 Cut six lead bar strips to ⅛x½x2⅝" (if you use the lead strips listed in the Buying Guide, you'll need to remove the adhesive strip from the weights and sand off any sticky residue). Epoxy three lead strips together for each side of the keel. After the epoxy cures, sand all four surfaces of each lead lamination smooth. On the band saw, cut each lamination to the bulletlike profile shown on the Keel-Shape Detail at *left*, and sand smooth again.
3 Now, epoxy one set of weights to each side of the keel. (We roughed up the surface on the bottom ½" of the aluminum keel for better adhesion when epoxying the leads strips to it.)
4 Sand the ends and bottom of the lead laminations flush with the keel. Sand a slight round-over along the bottom two edges. (See the Front- and Side-View Drawings for the proper shape.)
5 Cut the rudder to the shape shown in the Side-View Grid Drawing, and sand the cut edges smooth.

FITTING THE KEEL AND RUDDER TO THE HULL

1 Measure 2" down from the top of the keel, and mark a line across the keel at that point. Measure ¾" down from the top of the rudder and mark a line across it. You'll use these marks later to position them in the hull.
2 Test-fit the rudder and keel into their respective slots. (We accidentally got a little epoxy in the rudder slot, which prevented us from sliding the rudder in place. To solve our problem, we took a hacksaw blade and cut the slot back to shape.)
3 For better epoxy adhesion between the hull and aluminum pieces, sand both faces of the keel

and rudder from the top to the marked lines. Lay the hull topside down on a workbench with a piece of waxed paper between the hull and workbench top. Mix some epoxy and work it into the keel and rudder slots with toothpicks. Spread epoxy on the sanded portion of the keel, and insert it into the keel slot. Align the scribed line with the bottom edge of the hull, making sure the *bottom* edge of the keel aligns parallel with the hull *deck line*. Position the top edge of the keel 1/8" below the hull deck line (see the Side-View Grid). Repeat this procedure with the rudder.

4 To ensure a watertight seal, form a fillet of epoxy around the keel and rudder on the bottom surface of the hull (see the Front-View Drawing). (We mixed a small amount of fine sanding dust with the epoxy to keep it from running.)

5 For a smooth deck, use wood filler to fill any voids on the deck around the rudder and keel slots.

ATTACHING THE MAST AND MAINSHEET SCREW EYE

1 Cut a piece of 1/4" brass tubing to 1 3/4" long for the mast sleeve. Using a toothpick, dab a small amount of epoxy into the mast hole. Coat the lower, outside half of the mast sleeve with epoxy and slide it into the mast hole.

2 Dab a bit of epoxy on the mainsheet screw eye, and screw it into the mainsheet screw eye hole.

3 To form the mainsheet cleat, crosscut a 1/4" dowel to 1 1/4" long. Then, using a hacksaw, cut a 1/16" saw kerf 1/4" deep into one end of it. Epoxy the mainsheet cleat dowel in the mainsheet dowel hole in the hull.

4 Form a fillet of epoxy around the mast sleeve tubing and the mainsheet cleat.

FINISHING AND PAINTING

1 Mask off the mast sleeve tubing, mainsheet screw eye, and mainsheet cleat. Spray several coats of white polyurethane on the hull to build up a hard finish. Sand the last coat smooth with 400-grit sandpaper, being careful not to sand through the finish.

2 Mask off the deck, and spray several coats of gray enamel on the deck. Remove the masking after the enamel has dried.

BUILDING THE MAST AND BOOM

1 Crosscut a 1/4" dowel to 22 1/2" long for the mast and a 1/4" dowel 9 1/2" long for the boom.

2 Measure up 3" from the bottom of the mast dowel, and make a mark for the screw eye location. Drill a 1/16" hole 3/16" deep into the mast for the screw eye.

3 Drill a 1/16" hole 3/16" deep in one end of the boom for a screw eye. Then, cut a 1/16" saw kerf 3/8" long in the other end of the boom with a hacksaw.

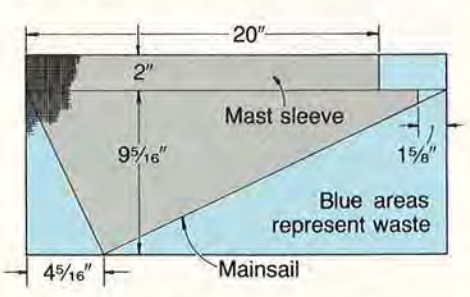
4 Measure 5" from the front end of the boom, and drill a 1/16" hole 3/16" deep for a screw eye. Using epoxy, glue and screw all screw eyes in place.

5 Using a pair of pliers, bend the loop on the mast screw eye open, hook it to the screw eye on the front end of the boom and squeeze the loop closed.

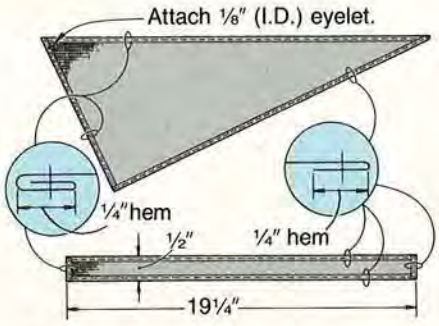
6 Insert the mast-boom assembly into the mast sleeve in the deck.

AND NOW FOR THE SAIL

1 Cut a piece of ripstop nylon to 11 5/16 x 23 3/4". Using the drawing *below* as a guide, cut the *mast sleeve* and the *mainsail* (two pieces) to the sizes shown.

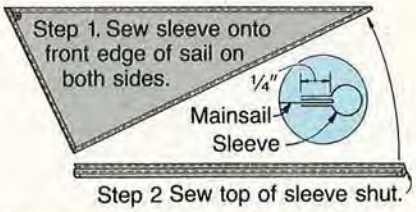


2 Referring to the drawing *above right*, fold and hem the mainsail. (We hemmed ours on a sewing machine set at a single-stitch position.)



3 Using an ice pick or compass end, poke a small hole in the back corner of the sail, and insert a 1/8" (inside diameter) eyelet. Close the eyelet onto the sail with a hammer and punch.

4 Fold and hem the sleeve as directed in the drawing *above*.



5 Finally, using the drawing *above*, follow steps 1 and 2 to sew the mainsail to the sleeve.

6 Slip the sail over the mast dowel, attach the mainsheet line (we used a fine string) and outhaul line through the eyelet, and you're ready to set sail for open waters.

SAILING THE LITTLE BOAT

When sailing our model, we allowed about 1 1/2" of string between the mainsheet screw eye and boom. Point the boat into the wind, and watch it tack back and forth as it sails across the water.

BUYING GUIDE

- **Sailboat kit.** Kit includes 3x3x36" B-grade balsa, 0.064x4x10" aluminum, 6-oz. package of lead strips, 1/4" (inside diameter) brass tubing, 4 — 1/2" screw eyes, 1/8" eyelet. $18 from Iowa Service Hobby, 2706 Beaver Ave., Des Moines, IA 50310, or call 515/279-1173.

Produced by Marlen Kemmet
Project Design: Kim Downing
Photographs: Bob Calmer
Illustrations: Bill Zaun

ARCHED-TOP SHELVING

Print this article

Looking for an attractive way to integrate your audio and video equipment and display your prized collectibles? If so, consider our modular wall system; it's easy to build, assemble, and add onto. The four-unit system shown in the photo *above* occupies almost 12 feet of wall space. But the project looks just as good if you build only one or two of the 34"-wide units.

Note: *The instructions explain how to make the components for a single unit as shown on the opposite page (two arches, one base, one back brace, one oak veneer plywood shelf, and one oak-framed glass shelf). The Bill of Materials on page 60 gives the number of pieces needed for a single unit. To make an additional unit, you simply make* one *additional arch, back brace, and base. If you're making more than one unit, we suggest you cut all identical pieces at the same time to ensure uniformity.*

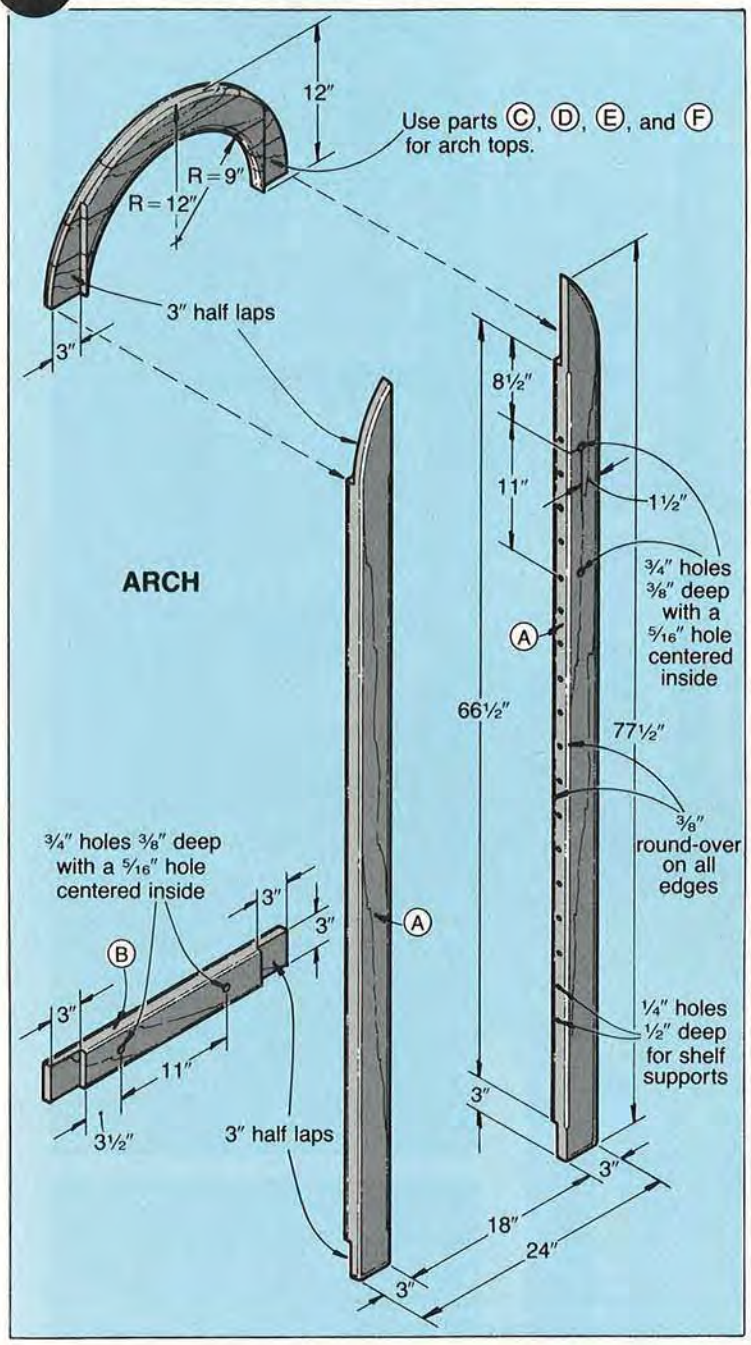
To build the wine rack and record rack that we've incorporated into our wall system, please refer to pages 76 and 79 respectively.

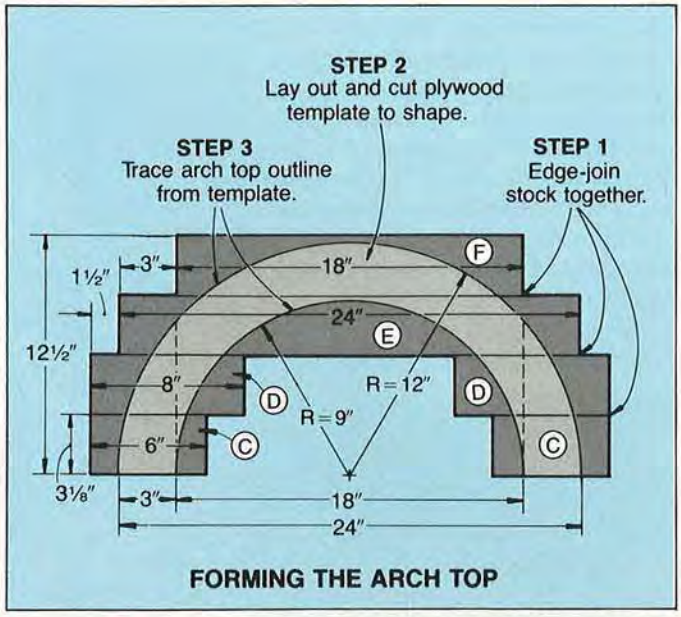
START WITH THE ARCHES

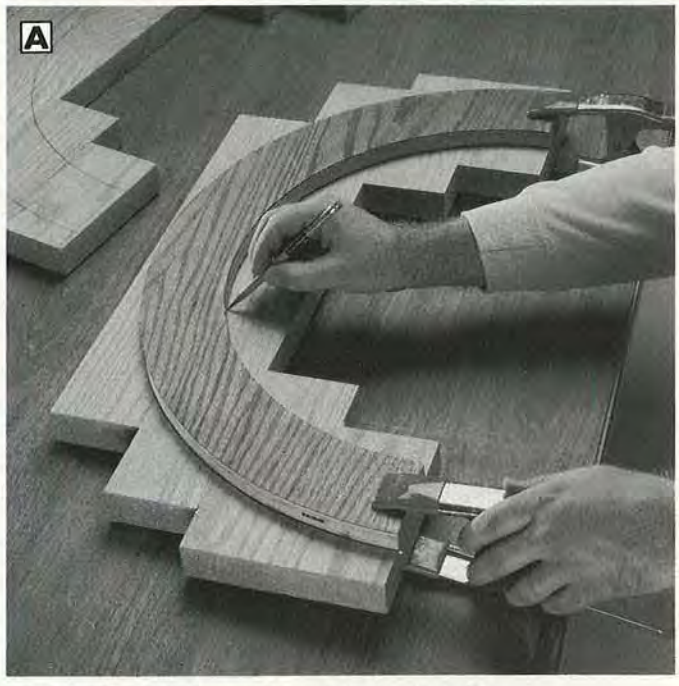
1 Cut the uprights (A) to size plus 2" in length. Cut the lower cross member (B) and the arch top pieces (C, D, E, F) to size.

2 Edge-join a pair of arch top blanks as shown on Forming the Arch Top Drawing. (We glued and clamped the C's to the D's and the E's to the F's, then we joined the two C-D laminations to each E-F to make two arch top blanks.)

SYSTEM



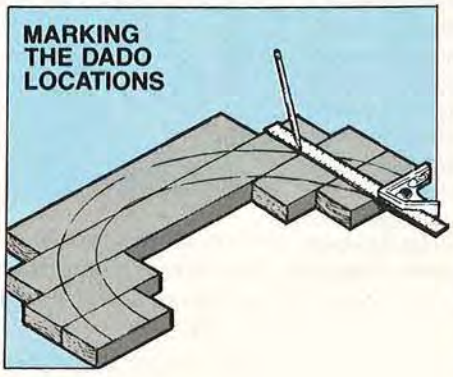




Marking the arch top outline with the template

3 To make a template for marking the arch tops, first cut a piece of plywood to 13x25″. Then, using the radii given on the drawing *top right,* lay out an arch top on the plywood. Cut the plywood template to shape, and sand the cut edges smooth.

4 Scrape the excess glue off the laminated blank, lay the template onto it, and trace the outline of the arch top as shown in photo A.



5 Using a square, mark the inside edge of each half lap joint (18″ apart) on each arch top lamination as shown on the sketch at *left* and dimensioned on Forming The Arch Top Drawing.

Note: *When cutting the half-lap joints on the ends of the arch tops, lower cross members, and uprights, be sure to cut the joints on the* same *side of each piece.*

Continued

6 To cut the arch half-laps, set your saw so it cuts half the thickness of your material. Working from either end of the blank, cut away the material up to the mark you just made (see photo B). Repeat this process at each end of each blank. Using a band saw, cut the arch tops to shape, cutting slightly *outside* the marked outlines (you'll need to re-mark the portion of the arch outline lost when cutting the half-laps joints).

Dadoing the arch top half-lap joints

7 Cut a 3" half-lap joint on both ends of the lower cross member (B) and the *bottom* end of each upright where shown on the Arch Drawing. To mark the location of the half-lap at the *top* of each upright, measure up 66½" from the *top* edge of the half-lap joint you cut in each upright, and mark a line across the uprights at that point. Cut to the marked line to form the half-laps.

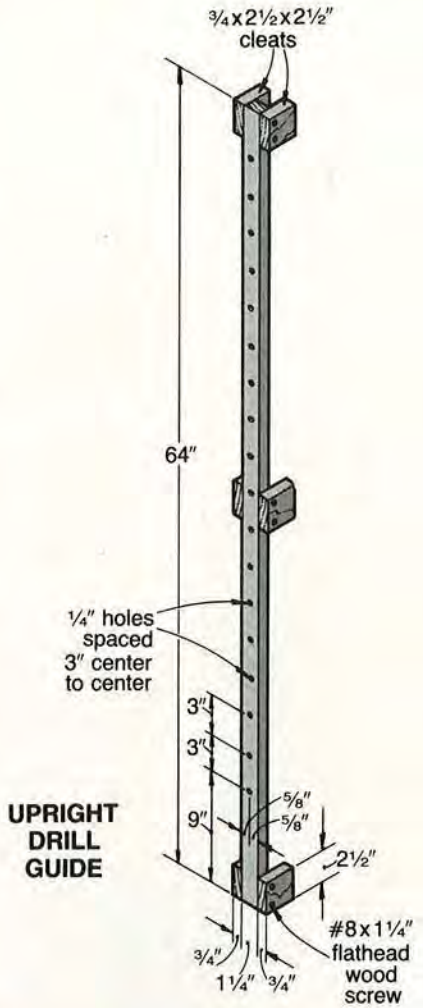
8 Glue and clamp each arch together, checking for square. After the glue dries, remove the clamps, scrape off the excess glue, and trim the uprights to match the curvature of the arch top.

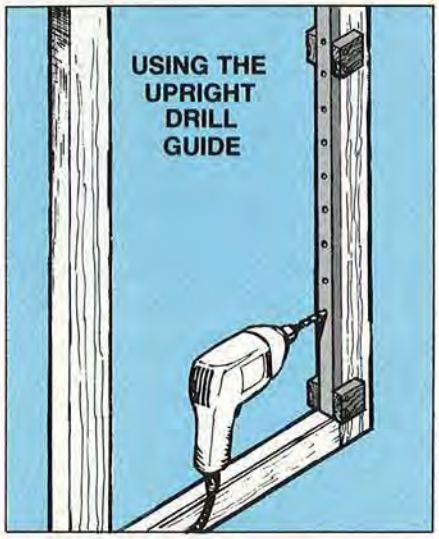
9 Sand the arch tops to finished size (we sanded the inside curve with a drum sander and the outside with a belt sander). Sand the arches smooth, then rout a ⅜" round-over along all edges.

10 To drill the shelf-support holes in the uprights, start by building the guide shown at *upper right.*

11 Position the drill guide against an upright and drill ¼" holes ½" deep. (The drill guide ensures consistent spacing from one upright to the next and eliminates wobbly shelves later. This is nearly impossible to do by measuring and drilling the holes one at a time.)

Text continues on page 62





Bill of Materials

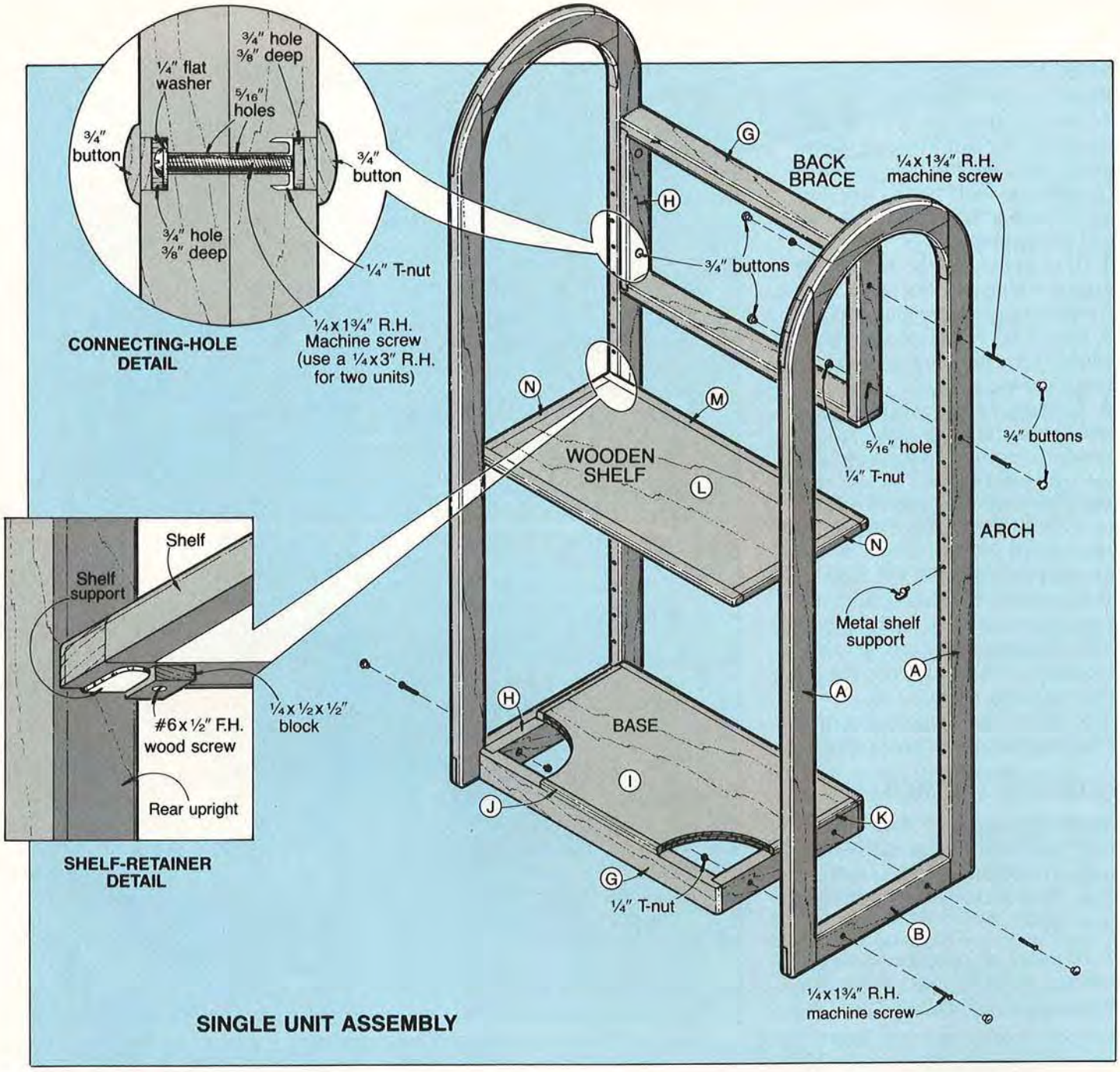
Part	Finished Size* T	W	L	Material	Qty.
TWO ARCHES					
A*	1¼"	3"	77½"	oak	4
B	1¼"	3"	24"	oak	2
C	1¼"	3⅛"	6"	oak	4
D	1¼"	3⅛"	8"	oak	4
E	1¼"	3⅛"	24"	oak	2
F	1¼"	3⅛"	18"	oak	2
ONE BACK BRACE AND BASE					
G	1¼"	3"	31½"	oak	4
H	1¼"	3"	18¼"	oak	4
I	¾"	18"	30"	oak plywood	1
J	¾"	¾"	31½"	oak	2
K	¾"	¾"	18"	oak	2
ONE OAK VENEER SHELF					
L	¾"	15½"	31¾"	oak plywood	1
M	¾"	1⅛"	34"	oak	2
N	¾"	1⅛"	15½"	oak	2
ONE OAK-FRAMED GLASS SHELF					
O	¾"	1¾"	34"	oak	2
P	¾"	1¾"	17¾"	oak	2

*Part marked with an * is cut larger initially, and then trimmed to finished size. Please read the instructions before cutting.

Supplies: ¼x1¾" roundhead machine screws (for double joint), ¼x3" roundhead machine screws (for triple joint, used when making more than one unit), ¼" flat washers, #6x½" flathead wood screws, #8x1¼" flathead wood screws, stain, polyurethane, smoked glass for shelves

BUYING GUIDE

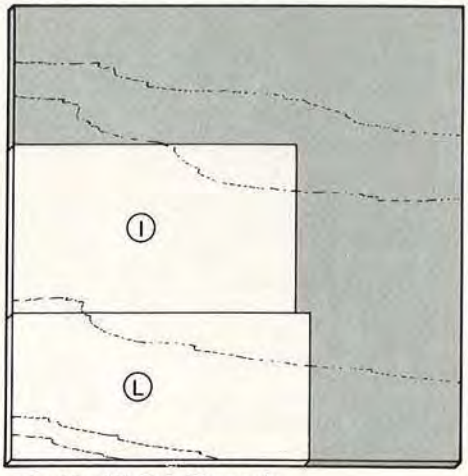
- **T-nuts.** Threaded socket with prongs for a sure hold. ¼-20, catalog no. D1305, $1.10 per 10. The Woodworkers' Store, 21801 Industrial Blvd., Rogers, MN 55374, or call 612/428-2199 to order.
- **Screw hole buttons.** Oak, for a ¾" hole, catalog no. B1029, 90 cents per 10. The Woodworkers' Store, address above.
- **Shelf supports.** Nickel finish, catalog no. D9153. Brass finish, catalog no. D9156. Walnut finish, catalog no. D9157. Fifteen cents each from The Woodworkers' Store, address above.



Cutting Diagram

4 pieces — 1¼x7¼x96" Oak

¾x7¼x96" Oak



¾x48x48" Oak Plywood

NOW, BUILD THE BACK BRACE AND THE BASE

1 To make the back brace and frame for the base (they're identical in size), cut the long pieces (G) and the ends (H) to size. Cut a 1¼" rabbet ⅝" deep across each end of the long pieces.

2 Glue and clamp the two frames together, checking for square. Later, scrape off the excess glue and sand.

3 Rout a ⅜" round-over along all edges of the back brace. *Do not* rout the base just yet.

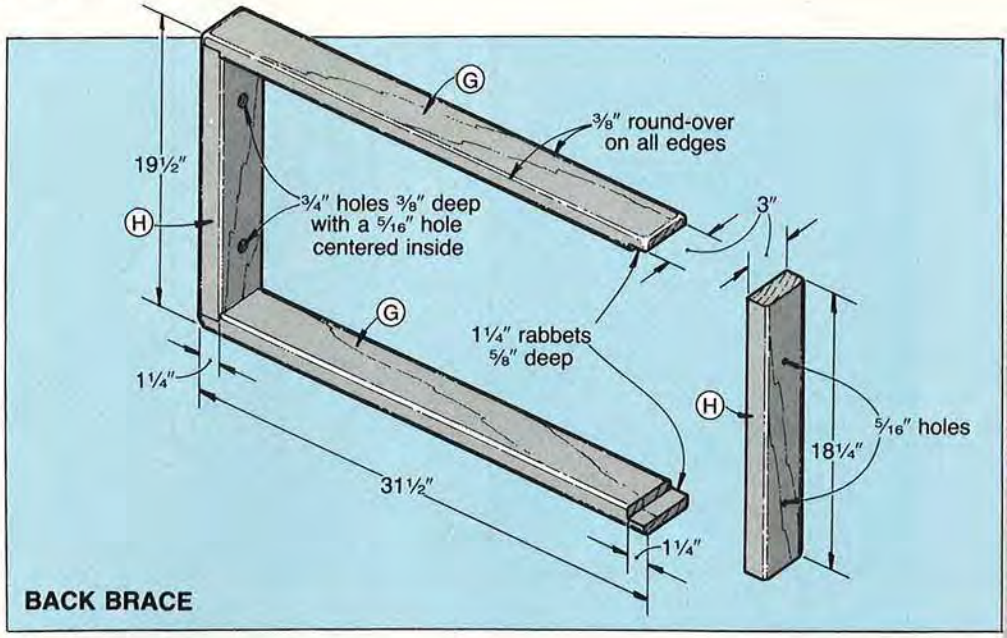
4 To make the base shelf (I), rip and crosscut a piece of ¾" oak veneer plywood to size. Now, cut the trim pieces (J, K) to size. Glue and clamp the trim pieces to the plywood. After the glue dries, remove the clamps, scrape off any excess glue, and sand the base shelf smooth. Glue and clamp the base shelf to the base, checking that all edges align flush and that the shelf is clamped firmly along the top edges of the base.

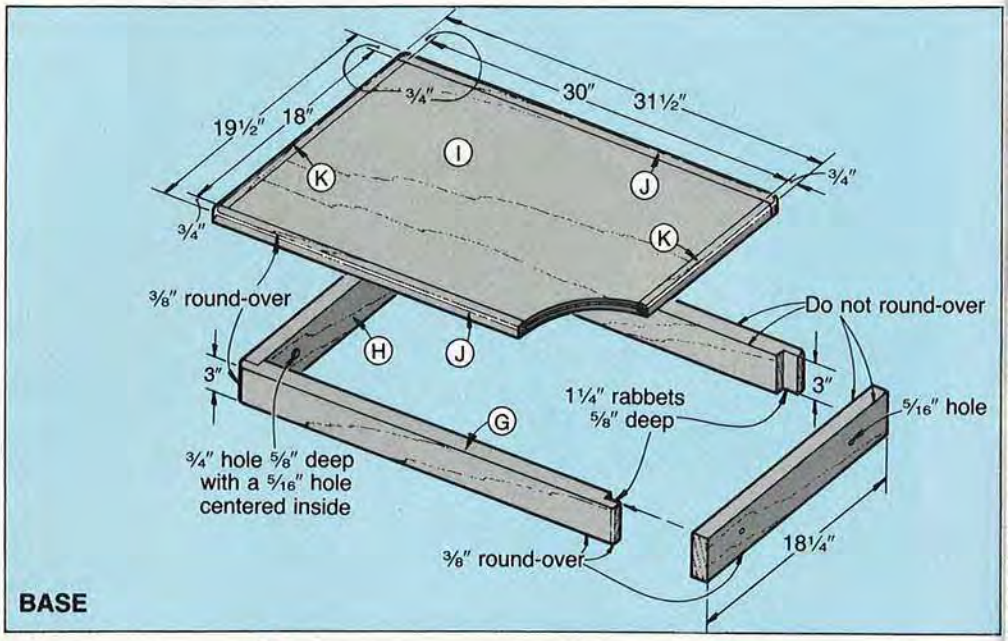
5 Sand the base smooth and rout a ⅜" round-over along all edges.

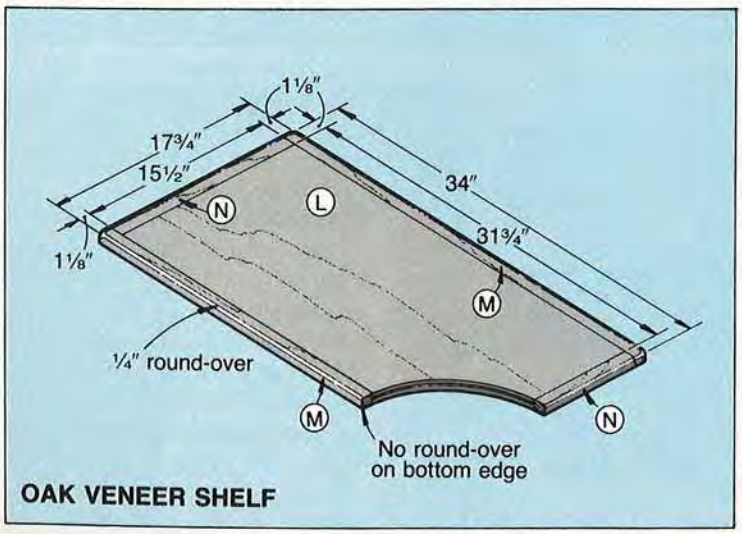
NOW, FOR THE SHELVES

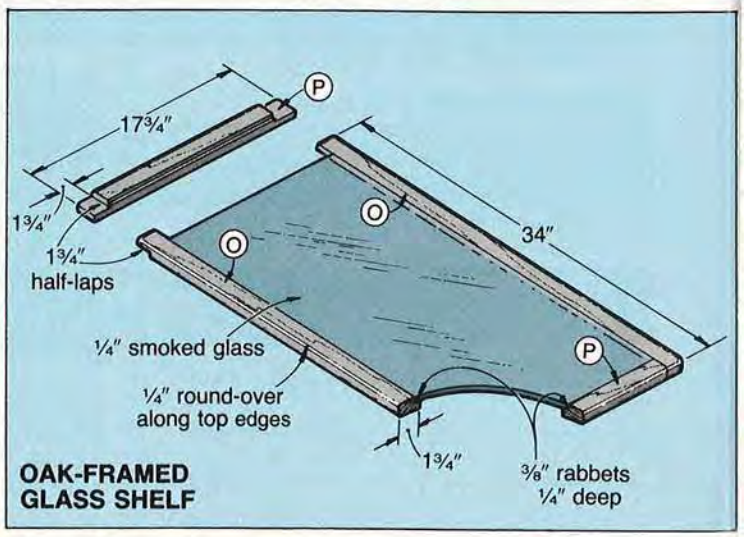
Note: *The wall unit shown has both oak veneer plywood shelves and an oak-framed glass variation. We'll show you how to build both types.*

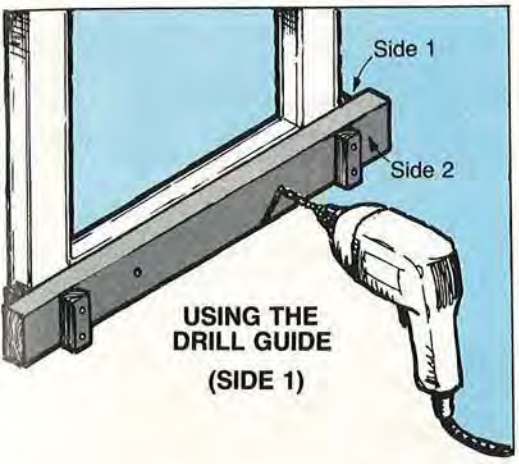
1 *To make an oak veneer shelf,* cut a piece of ¾" oak veneer plywood (L) to 15½x31¾".



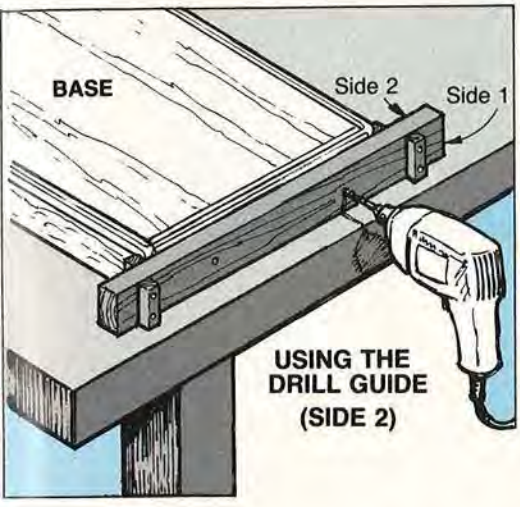




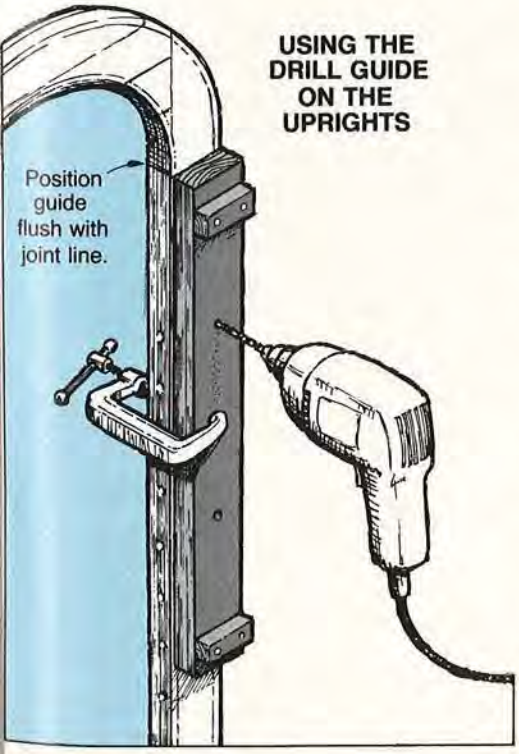




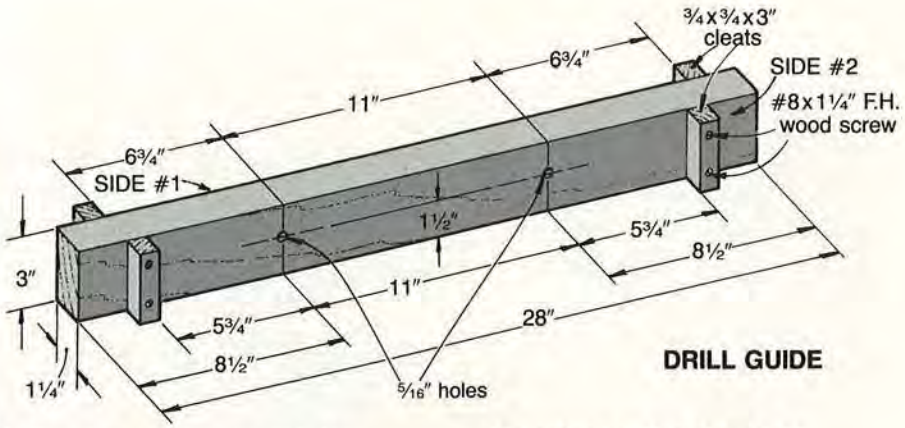
USING THE DRILL GUIDE (SIDE 1)



USING THE DRILL GUIDE (SIDE 2)



USING THE DRILL GUIDE ON THE UPRIGHTS



DRILL GUIDE

2 Cut the trim pieces (M, N) to size. Glue and clamp the trim pieces to the edges of the plywood. Later, sand smooth and rout a ¼" round-over on the top edges. *Do not* rout the bottom edges.

3 *To make an oak-framed glass shelf,* cut frame members (O, P) to size. Cut half-lap joints on the ends, and glue and clamp the pieces together, checking for square. Sand smooth, and rout a ⅜" rabbet ¼" deep on the top inside edge and a ¼" round-over along the top outside edge. Using a chisel, square the rounded-rabbeted corners. Have smoked glass cut to fit each shelf.

NEXT, DRILL THE CONNECTING HOLES AND ASSEMBLE THE PIECES

1 To drill matching holes in the arches, back brace, and base, make the drill guide shown *above.*

2 Position *Side 1* of the guide against a lower cross member (B) and drill a pair of 5/16" holes as shown on the sketch *above left.* Repeat for each cross member.

3 Now, using *Side 2* of the drill guide, drill a pair of 5/16" holes through each end of each base and back brace as shown on the sketch *above left.*

4 Remove both cleats from either side of the guide. Use the guide to drill a pair of 5/16" holes in each rear upright as shown in the sketch at *left.*

5 Drill ¾" holes ⅜" deep centered over the 5/16" holes on the inside of each back brace and base (we used a Forstner bit to accurately center the ¾" holes directly over the 5/16" holes). Drill the same-sized holes in the rear upright and lower cross member of each arch.

FINISHING AND FINAL ASSEMBLY

1 Finish-sand all the pieces now, before they are assembled. Finish as desired (we finished ours with a light reddish stain and several coats of polyurethane).

***Note:** It will be easier to assemble the unit front side down on the floor. Then, with helpers if it's more than one unit long, raise the unit upright against the wall.*

2 To assemble the pieces, start by positioning a base between two arch bottoms. Insert a ¼" T-nut in each ¾" hole on the inside face of each base end where shown in the Connecting-Hole Detail on the Single Unit Assembly Drawing on page 61. (We misaligned a few of our ¾" holes and had to grind the T-nuts to fit into both the ¾" and 5/16" holes.) Slide a ¼" machine screw and washer into each ¾" hole in each arch bottom and thread the machine screw into the mating T-nut. Now, repeat these procedures with the back brace. Tighten the screws. Later, insert ¾" screw hole buttons in the ¾" holes to hide the screws and T-nuts.

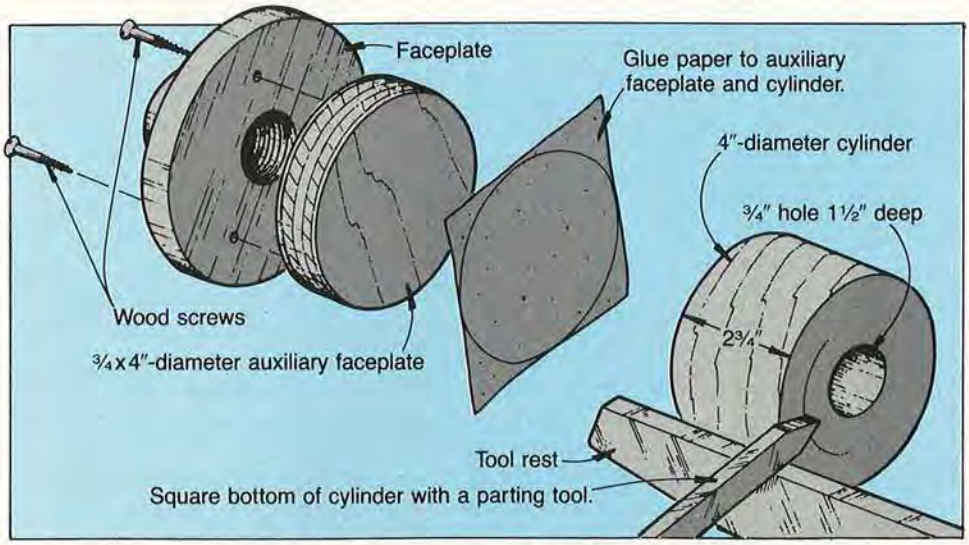
3 To ensure that the shelves will stay put when you install them, cut two ¼x½x½" retainers for each shelf. Insert four shelf supports in the uprights at the same level, and position a shelf on them. Mark the position of the two shelf supports along the bottom back edge of each shelf. Drill and countersink a hole in each retainer, and screw in place where shown in the Shelf-Retainer Detail on the Single Unit Assembly Drawing.

Designed and Produced by Marlen Kemmet
Photographs: Bob Calmer; Hopkins Associates
Illustrations: Kim Downing; Randall Foshee

The Executive PAPERWEIGHT

Print this article

How many times have you stashed away a small block of beautifully grained wood waiting for just the right opportunity to use it? Well, here's the project you've been yearning for. You'll want to make several of these distinguished-looking creations to have on hand for those special gift-giving occasions. Note, we turned one from walnut, another from spalted maple, and one from a lamination.



READYING THE STOCK

1 Select a block of wood measuring approximately 4¼" square by 3" thick. If you don't have stock this thick, laminate thinner stock.

2 On the bottom of the block — the 4¼"- square surface — draw diagonals to find its center. Using a compass and the center point you've just located, draw a 4"-diameter circle. Saw the block to shape with a band saw, cutting just outside the marked circle.

3 Drill a ¾" hole 1½" deep at the 4" circle center point. (The hole will give you a depth reference, making it easier to turn the washer recess to size later.)

4 Cut a 4"-diameter disk from ¾" plywood scrap. Center and screw it to a faceplate to form an auxiliary faceplate. Center, and glue and clamp the *top* surface of the cylinder (opposite the end with the ¾" hole) to the auxiliary faceplate. (We used a glue and paper joint between the two.)

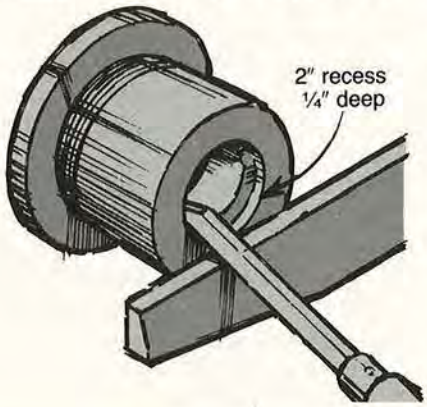
LET'S START TURNING

***Note:** The turning process involves two basic steps. First, mount the cylinder to the lathe, square the bottom, and turn the 1⅜" hole and plug recess to size.*

Next, you remount the plugged and weighted cylinder and turn it to shape. For more information on this type of turning, refer to our faceplate turning techniques article starting on page 38 in the December '86 issue of WOOD.

1 Mount the faceplate-cylinder assembly to your lathe, and set the lathe speed to about 800 rpm. With a ⅜" or ½" gouge, rough-turn the blank until it's perfectly cylindrical. Square up the bottom as shown in the drawing *above.*

2 Enlarge the ¾" hole you drilled earlier to 1⅜" (we used a parting tool). The hole should be just wide enough to accept 1⅜"-outside diameter washers, which you'll use to add weight to the paperweight. With a parting tool or skew, form a 2"-wide recess ¼" deep to house the plug as shown in the drawing *below left.*

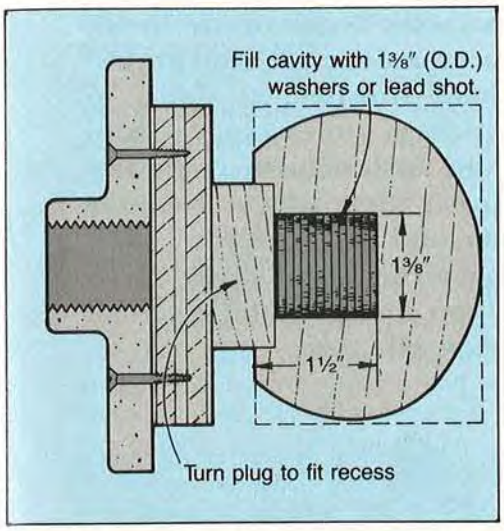


3 Remove the assembly from the lathe, and separate the cylinder from the auxiliary faceplate by breaking the paper-glue joint with a chisel. Sand or turn the auxiliary faceplate smooth for good adhesion to the plug blank in the next step.

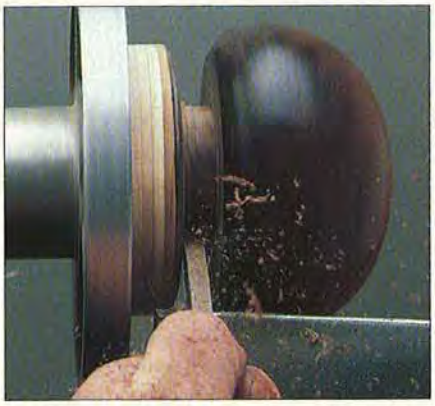
4 To fashion the plug for the bottom of the paperweight, cut a 2¼"-diameter disk from a piece of ¾" stock. You can use the same kind of wood as the paperweight or one of a contrasting color. Center and glue the disk to the auxiliary faceplate, and mount it to your lathe. Use a skew to form a plug from the disk to fit snugly in the recess. (When turning the plug to size, we stopped the lathe periodically to check the fit).

5 Lay the turned cylinder on a flat surface with the hole facing up. Insert flat washers in the 1⅜" hole (or fill with lead shot) for weight. Mix the epoxy (we used slow-set), and pour it into the 1⅜" washer-filled hole. Epoxy the plug (still mounted to the faceplate) into the ¼"-deep recess.

A Heavy-Duty Solution to the Paper Chase



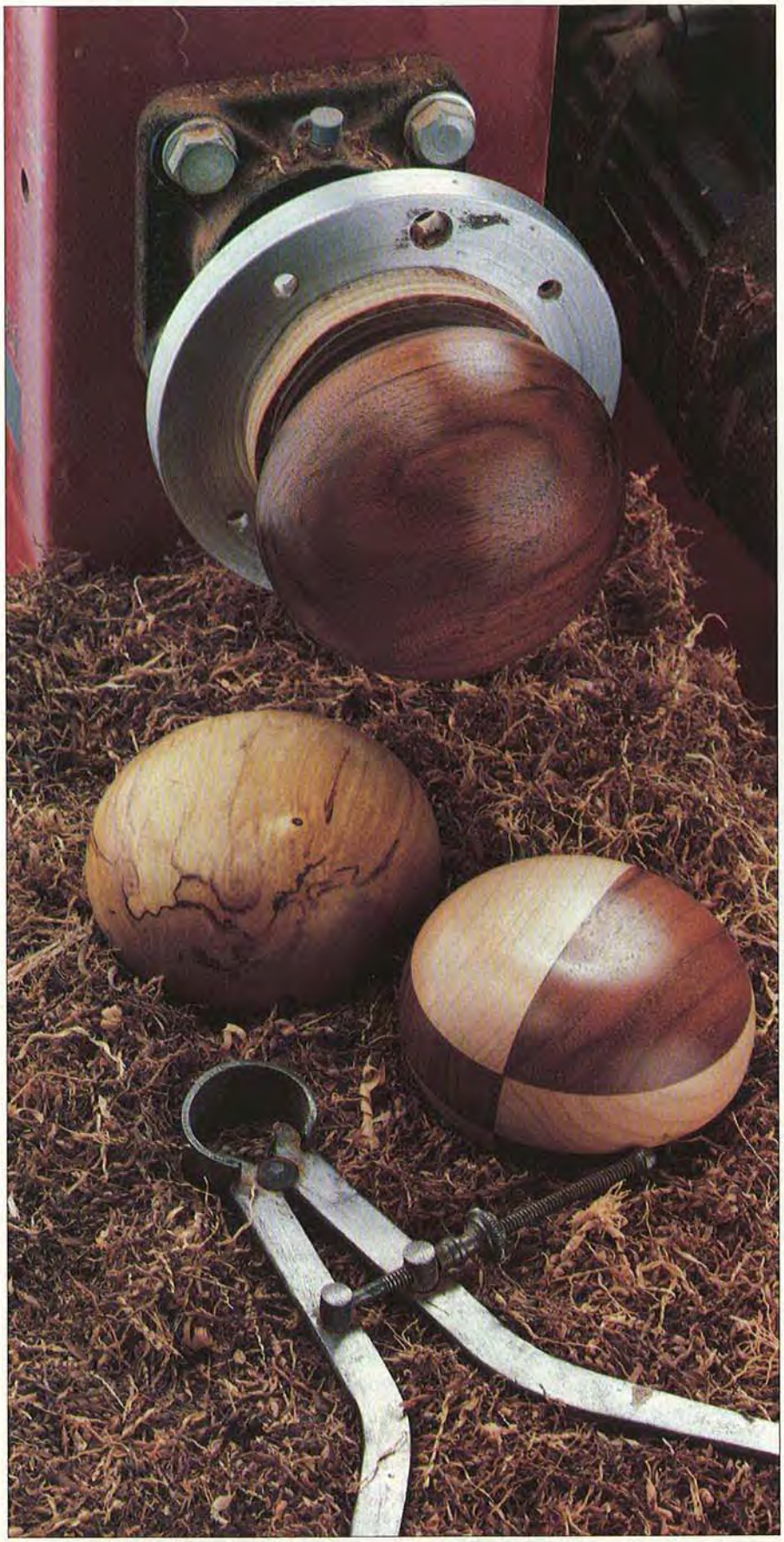
6 After the epoxy has cured (24 hours in our case), remount the faceplate and cylinder to the lathe. Turn the cylinder to shape using the drawing *above* as a reference. Adjust the lathe speed to about 1,200 rpm, sand the paperweight smooth, and apply the finish (we used an oil finish).



Parting the paperweight from the lathe

7 With a parting tool, cut a groove about ½" deep in the plug stock, flush with the bottom of the paperweight, as shown in the photo *above*. Stop the lathe, and use a backsaw to cut through the rest of the plug, being careful not to let the paperweight fall.

Project Design: Clead Christiansen



Illustrations: Kim Downing

Photographs: Bob Calmer

LACQUER

Lacquer has long been the mainstay finish of the furniture manufacturer and professional finisher. Its ability to produce a pleasing yet subdued luster finish rivals any finish alternative. Lacquer can, and will, give your work that professional touch, too — if you carry out the essential steps with care.

Print this article

IN SEARCH OF THE PERFECT FINISH

Do you or any of your woodworking friends have a super finishing technique you'd share with us and possibly other *WOOD* readers? If you do, we'd like you to write and tell us about it. Please drop us a line at

In Search of the Perfect Finish
WOOD Magazine
1716 Locust St.
Des Moines, IA 50336.

Finishes that stand out beg to be looked at and to be touched. We all appreciate and would like to be able to produce these ultrafine finishes ourselves. Fortunately, these pride-builders really aren't all that difficult to work with. And lacquer, once you know and understand how to use it, can be your new finish standard.

As with the other articles in our "In Search of the Perfect Finish" series, we consult with persons who've had lots of experience with the finish. In this case, we only had to walk into the *WOOD* shop and talk finishing with our project builder Jim Boelling. Lacquer happens to be Jim's absolute favorite finish. He's been using it on his projects for about 20 years.

Just what is lacquer, anyway?

If you take a look at the contents on a can of lacquer, you'll see nitrocellulose, the same stuff they use in gunpowder, making up the solid phase of the formula. It forms the actual film you put on the wood.

There's another detail you'll note reading the contents label. Lacquer contain only 20-30% solids. When you thin it for application, you reduce the solids content still more. As a result, you really don't apply very much material in one coating. By comparison, varnish typically contains about 50% solids.

The other ingredients in lacquer, with their long scientific names, simply dissolve and carry the nitrocellulose. They evaporate quickly after application.

The advantages warrant considering lacquer

Long-time lacquer advocates, such as Jim Boelling, prefer lacquer as an indoor finish because it produces a flexible but tough film that resists wear and normal use. It's easy to apply, and dries fast, too.

Because of the low solids content, each lacquer application puts down a very thin film. To create a high-quality finish, you have to apply multiple coats to build up the film. Fortunately, each new coat melts into the lacquer, making one tight-bonding film. You simply sand lightly between coats.

Lacquer has another advantage too — it's easy to sand, rub, and polish the film to get the degree of luster you desire.

THE CHOICE OF MANY PROFESSIONALS MAY BE PERFECT FOR YOU

Two, four, or how many more spray coats?

"If you're after a quality lacquer finish," Jim Boelling says, "forget the shortcuts. For a good finish, you have to apply numerous coats, and that takes time and effort. If you don't have the time to work lacquer the way it should be worked, you'll probably be better off using some other finishing product."

So, how many coats do you need to apply? Our answer may sound evasive to you, but really it isn't. The number of coats depends on just how good a finish you want and what you are working with.

Lacquer has a selfish quirk — it only works with certain products. For example, using lacquer over oil- or varnish-based fillers or sealers can be touchy. The strong solvents in the lacquer can soften, dissolve, or even "lift" incompatible underlying materials and cause bleeding and adhesion problems. You can try to seal them with just a light mist coat of lacquer sealer. But to be safe, Boelling recommends using only materials formulated for lacquers.

It's best to spray lacquer, but you can brush it, too

Spraying produces the smoothest surface, free of brush marks and contaminants. On woods that give off color, or if you want to lacquer over a filler or stain, spraying may be the only way to avoid lifting or smearing them.

You can also buy lacquer in aerosol cans. We find they serve nicely around the *WOOD* shop for touch-up and many small jobs. "But," warns Boelling, "aerosol lacquer comes highly thinned, so you'll need to apply even more coats, to get the desired film depth.

If you want to brush on lacquer, and that makes sense on small projects, buy a *brush formulation*. Brush types dry slower than sprays, so you have more time to apply.

Directions call for thinning lacquer sealer and the gloss coats. But be sure to use thinners compatible with the lacquer you buy. If you don't know which one to buy, check the can's label.

If you spray during hot, humid weather, consider adding a blushing agent to the mixture. It helps keep the lacquer from turning white (milking). This problem occurs when the nitrocellulose absorbs moisture from the atmosphere and traps it in the finish.

Build film with gloss coats

The real advantage of lacquer lies in the ease with which you can *control* the exact surface sheen wanted. Typically, you start by applying two or more thin coats of lacquer sealer.

Sanding between sealer coats (and all coats) removes surface blemishes and levels the surface. Sanding sealer films can be built up, but Boelling advises not to let them. Sand off most of the sealer.

To build up the film, use gloss lacquer — it produces a tough, clear film. If you want a high gloss as the final surface, use it for the topcoat, too. Then rub and polish as little or as much as you need, to get the luster you want.

Earlier we said there were no shortcuts. Well, there's one. Apply a satin- or semigloss-formulated lacquer for the final coat. Or, add a flattening agent to the gloss lacquer. Both produce a lower surface sheen.

You can use a number of materials to produce the final finish. We've heard of woodworkers using everything from steel wool and beeswax, to rubbing with pumice and paraffin oil. A few even swear by the special automobile rubbing compounds and pastes they've uncovered along the way.

PLAY IT SAFE

Be aware of two major inherent hazards — the possibility of explosion, and the chance of bodily injury from direct contact.

The chief culprits: the solvents and thinners in lacquer. When volatilized or atomized into fine droplets in the air, they form mixtures that can ignite by an open flame or spark. If you smoke, or if you have to do the spraying in a confined area where there are pilot lights or other kinds of ignitors, use a different finishing product.

Confine spraying area

Apply lacquer only in areas with adequate ventilation. If you must spray indoors, confine it to a properly designed and equipped booth. Mechanical exhaust fans provide the most positive ventilation. However, the ventilator motors must be *flame-* or *sparkproof*, too. As a further precaution, use only explosion-proof lights in the spray area.

If you can't spray at home, try to rent time in a professional spray booth at a business or school. Or hire a shop to do it.

Protect your body, too

Minimize direct physical contact with lacquer and thinners. Wear protective gloves to cover your hands, goggles to protect your eyes, and a chemical-filtering respirator to protect your air passages and lungs. Your dealer should be able to supply you with the necessary protective equipment, or direct you to a source.

Do not rely on the lightweight paper dust masks. They won't adequately protect you against noxious vapors and the fine spray mists.

Continued

PROPER APPLICATION: THE KEY TO A QUALITY FINISH

Equipment you need: Use an air compressor or an airless spray system. Compressors with an air tank and capable of supplying at least 50 pounds of pressure work best. Select a siphon-feed gun with an external-mix nozzle and a needle sized for lacquer.

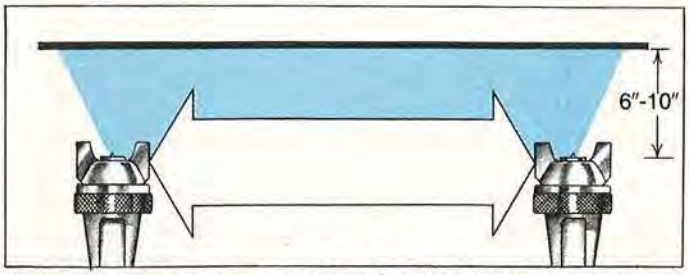
Adjustments to make: Set the pressure regulator to provide good spray atomization — between 35 and 50 psi — but without causing misting. Fan-shaped patterns work best for spraying flat, wide surfaces; use a round pattern for small, irregular surfaces, or close work. To make the pattern you want, test spray on paper or cardboard. Adjust the *pattern control* (top control knob on a gun) holding the gun 6"-10" from the spray surface. Adjust the *fluid control* knob until the gun applies the amount of spray you want. If the spray looks too fine or light, *reducing* air pressure or *opening* the fluid control *increases* droplet size and flow rate. If the spray appears too coarse, *closing* the fluid control *reduces* both flow rate and droplet size.

Holding the gun: Hold the gun at a uniform distance from the spray surface. Avoid arcing your spray strokes — arcing causes more spray to be deposited at the center than at the ends. Move the gun across the surface at a constant speed that's comfortable for you. Pull the trigger as you reach the leading edge, release the trigger as you reach the opposite edge. Tip: Making a single full stroke parallel to the ends of the piece ensures complete coverage and eliminates waste trying to spray to the very edges.

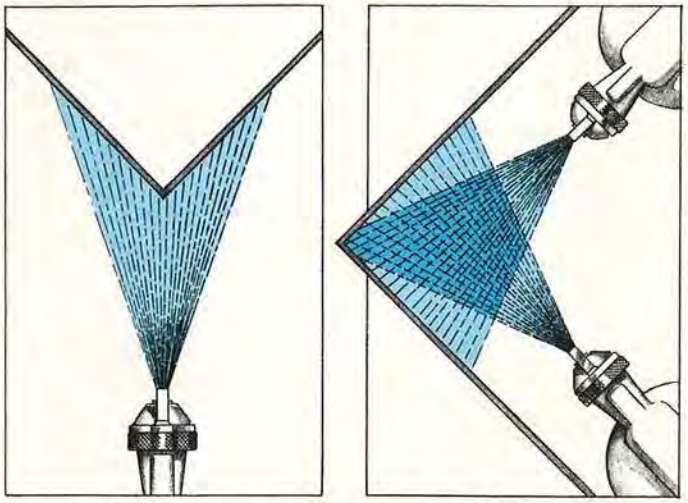
Best spraying sequence: Make the top or outside edge of the previous stroke your aiming point so each pass overlaps the other by 50%. This provides double coverage and a wet coat without streaking. If you want to double-coat, apply the first coat, stroking *with* the grain. Spray the second coat *across* the grain.

Spray *outside* corners square-on to uniformly coat the edges. On slender items, such as table legs, adjust the gun's pattern to fit the surface to reduce overspray. On *inside* corners, spray each side of the corner, only slightly overlapping. Overlap 50% on round objects.

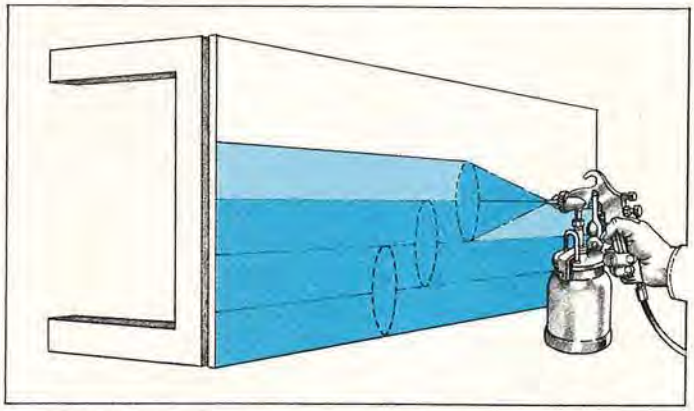
The proper brushing technique: Select a medium-soft, natural-bristle brush. (You can use a small foam brush or nylon wipes for small jobs.) Load the brush to about one-half the depth of the bristles, then wipe excess from the tip on the edge of the can. Flow the lacquer onto the surface, working with the grain, and from dry to wet surfaces. Reload the brush frequently and don't spread the lacquer too much. Work in strips about 1½ times the brush's width. To avoid obvious brushing patterns, work lengthwise with the surface rather than in short lengths across it. Avoid overlapping onto a partially set area — you can coat missed areas later. Brush out any air bubbles.



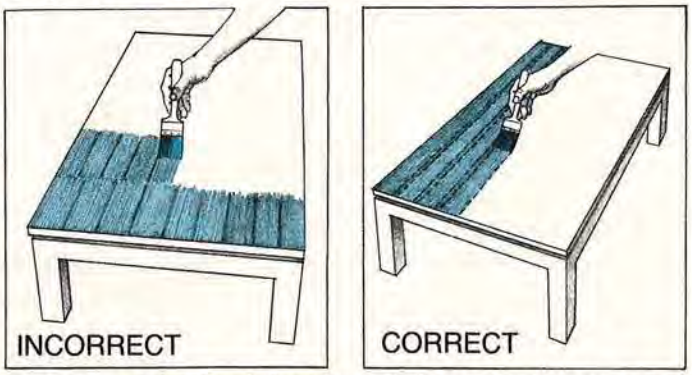
Move gun at constant speed and maintain uniform gun-to-surface distance to deposit an even coat.



Spray outside corners straight-on. Spray each side of an inside corner separately with small overlap.



Overlap previous spray lap 50% for uniform wet coat. Let overspray fall on unsprayed area.



On long surfaces, brush lengthwise full length of surface rather than in short lengths.

As you sand, inspect the wood surface with strong cross light to spot dents and scratches that need to be sanded before lacquering.

Test viscosity by timing flow rate through a viscosimeter. You can buy one at a paint store.

Sand the sealer to level the surface. Back sandpaper with a firm block for sanding on flat surfaces, a foam pad for irregular surfaces.

Glossy areas show low spots. Apply more sealer coats to fill low spots and sand the surface.

Use a felt pad, such as a felt eraser, and rub, first with mixture of pumice and paraffin oil, then rottenstone and oil.

EIGHT STEPS TO A PERFECT LACQUER FINISH

***Note:** Follow a planned program to ensure best results. With experience, you will probably develop your own step-by-step system. In the meantime, here's an outline to get you started:*

1 *Prepare the wood.* First, check joints for traces of glue. Wetting the wood around glue joints with lacquer thinner shows up embedded glue. Sand off any trace of glue.

Sand to level the wood surface. Start sanding with a coarse grade of sandpaper — 80- or 100-grit — and mount it on a wood or rubber block. Sand with the grain. Use progressively finer grit sandpapers to remove sanding marks.

2 *Inspect the wood.* Rotate the piece in front of a bright light and inspect it from a variety of angles (photo A). Look for shadows which show up dents, scratches, and other surface marks.

Sand any flaws you find.

3 *Stain the project.* Stain or fill the wood with lacquer-compatible products only, if desired.

4 *Prepare the lacquer sealer.* To thin for spraying, test with a viscosimeter (photo B). Compare that time with the value suggested for lacquer on the viscosimeter. If it takes longer, add more thinner.

Mix the lacquer sealer and thinner with a clean paddle — do not shake. Warm the lacquer by placing it in a pan of hot (140°F) tap water. Heating drives out air bubbles and helps it flow on the surface better. If brushing, follow thinning directions on the can.

5 *Apply the sealer.* Spray on a thin, even coat, until the entire surface appears wet. Let the sealer dry for an hour or two, then sand smooth with 320-grit sandpaper. Sand in one direction. Back the sandpaper with a firm rubber or felt pad. Sanding produces a white dusting on the wood surface (photo C). Sand away most of the lacquer sealer, but do not sand through to bare wood. Apply a second coat of sealer, let dry, then sand.

If brush-applying, apply a thin coat, as uniformly as possible.

6 *Inspect the sealer.* Remove the sanding dust and look for shiny spots or areas. If you see both dull and shiny spots, it means the surface has not been completely leveled and you need to apply another coat of sealer. The mottled appearance of the clothes hanger (photo D), indicates it needs another coat.

7 *Build up lacquer coats.* Use gloss lacquer for the buildup coats. Use a viscosimeter to determine how much you need to thin, or thin about 25%. Warm the lacquer in a hot tap water bath.

Apply a uniform coat, just heavy enough to wet the surface. If brushing, apply enough so the lacquer flows and levels itself.

Let the lacquer dry for an hour or two, then sand lightly with 320-grit sandpaper. Sand to level surface and correct imperfections.

If pores are visible in the film surface, it needs more buildup and leveling. You want to see a perfectly level surface without any pores.

Apply the top or finish coat full strength (undiluted). For a high-gloss finish use gloss lacquer for the final coat. Allow it to dry several days before rubbing.

8 *Rub out the topcoat.* Dip a felt pad in a mixture of pumice rubbing compound and paraffin oil, and rub lacquered surface (photo E).

You want a uniform luster, so as the final step, polish with rottenstone and paraffin oil, a rubbing compound, or a special nylon rubbing pad. Finally, apply a wax or lemon oil, and then polish.

Produced by Dale Ohrtman and Charles E. Sommers Photographs: Bob Calmer Illustrations: Kim Downing, Jim Stevenson

PLANE AND JOINT THE EASY WAY WITH A HAND-HELD

For sheer speed and convenience, you can't beat these hardworking, portable planing tools.

Print this article

The Makita 1900BW: one of the new lightweight hand planers designed for one-handed operation.

What do you use these tools for, anyway? If you answer "edge-planing doors", you're right. The early models were designed to do just that, and little else.

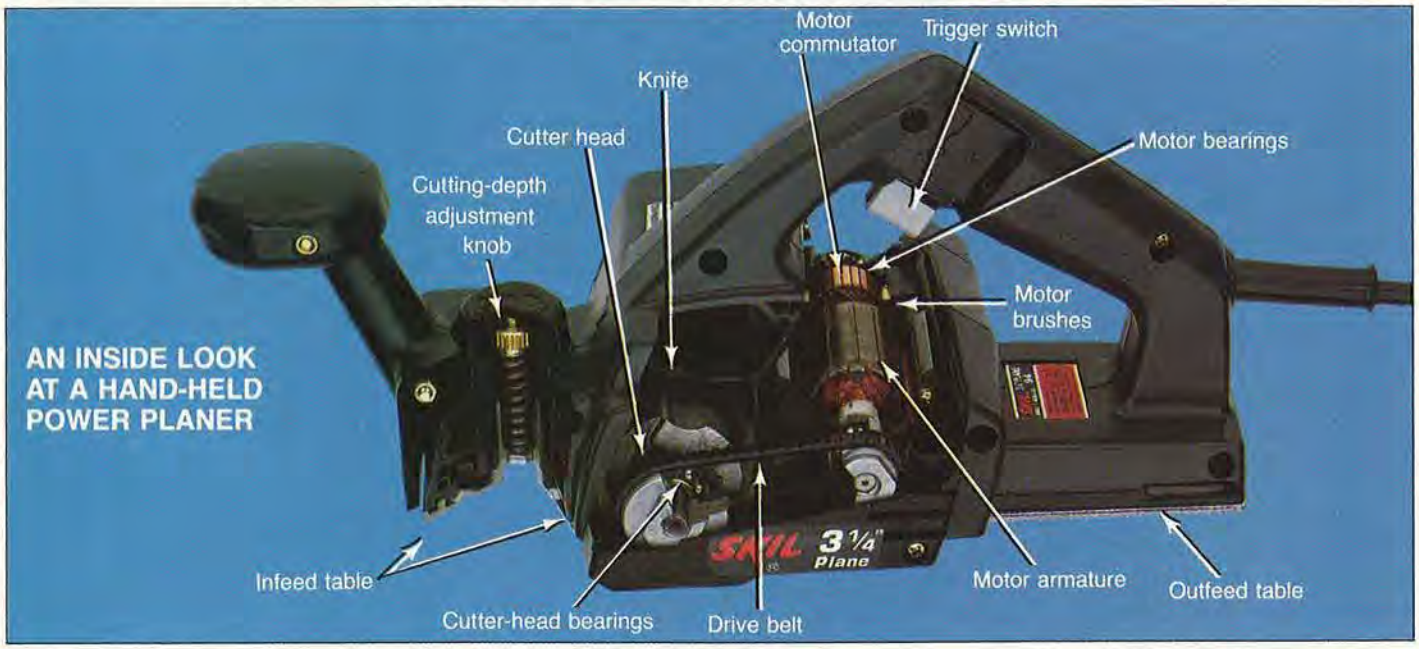
But today, you'll find a whole new generation of these tools, loaded with features that make them much more versatile than their single-purpose predecessors. As a result, more and more home woodworkers are discovering some of the advantages these tools have over hand planes, jointers, and stationary planers.

To meet the increased demand for these tools, manufacturers now offer a wide range of models — close to 30 in all. For this report, we took a close look at a healthy cross-section (19 of them), pictured on page 74. You'll find the rest in the chart on page 75.

PLANE POWER IN A SMALL PACKAGE

Hand-held power planers fill the void between hand planes and stationary jointers. In fact, you can look at these tools as small, upside-down jointers with a handle. They do have shorter infeed and outfeed tables than a jointer, so it takes a bit more finesse to true up lumber with a power planer. But they work great on stock too heavy,

POWER PLANER



bulky, or wide to run through a jointer.

Power planers won't give you the glass-smooth cut of a well-honed hand plane. They do come close to it, though, and do the job much faster, with less effort.

You'll also find these quick, versatile tools great for roughing-down large glued-up surfaces, such as tabletops and door panels. These jobs can quickly gum up or overheat a belt sander. If equipped with a fence or edge guide, they'll quickly true up the edges or faces of stock for perfect glue joints.

Speed and portability also make hand-held planers perfect for jointing or planing cabinets and other assembled projects. Bowl turners use them to plane the surfaces of chain-sawn bowl blanks, in order to see the grain pattern clearly.

Some hand-held planers feature a tilting fence for cutting chamfers and bevels at any angle up to 45°. Many also include guides for cutting rabbets (see page 72).

CUTTING CAPACITY: HOW MUCH DO YOU NEED?

Manufacturers size power planers by knife length, which determines the width of cut (see chart on page 75). Most planers make cuts up to 3¼" wide, suitable for most jobs you'd do with the tool.

If you do much work with standard dimensional lumber, we suggest you consider one of the slightly larger, 3⅝" models. They can plane 4" lumber (1x4s, 2x4s, and so forth) in one pass.

When planing large, flat surfaces, the wider the cut, the fewer passes you need to take. And the fewer passes you take, the less chance of your tilting the planer and gouging the surface.

Hitachi, Makita, and Ryobi make planers capable of making 6"-wide cuts. Initially designed for use in post-and-beam construction, these monsters easily outperform the others on large, flat surfaces. But they're expensive (over $450). Their large size and weight also make them harder to use on smaller planing jobs.

To set depth of cut, you raise or lower the infeed (front) table by means of a knob or lever. The maximum depth of cut varies between planers.

Comparing planers with the same cutting width, you'll find the more powerful ones usually cut deeper. Typically, a tool with a maximum cutting depth of 1/16" will smooth most rough-sawn stock in a single pass. With some of the more powerful planers, you can take a cut up to 1/8" deep. But that's pushing units with motors under 7 amps to make this deep a cut in dense hardwoods.

Otherwise, we found the power and cutting depth adequately matched on the tools we reviewed, even on the least-powerful models (3 amps and under). These include the Black & Decker 7696 (1/48"), Sears 17371 (1/50"), and Skil 1535 (1/64"), all of which cost under $80. Because these tools take such shallow cuts, it may require several passes to smooth down rough-cut stock with them.

GETTING A SMOOTH CUT: YOU'RE IN CONTROL

Like big jointers and planers, hand-held planers have a rotary cutting action. Except for two Porter-Cable models, all have two straight knives clamped into a revolving cutter head. On each cut (two per revolution), the entire length of each knife edge hits the stock at once, scooping out wood to the depth set on the planer.

Continued

HAND-HELD POWER PLANER

At a cutter-head speed of 12,000 to 16,000 rpm, the knives take thousands of shallow, overlapping, cupped cuts per inch. This can create rows of minute lines across the cut, though they're usually so small you can't even see them.

These mill marks become more pronounced the faster you push the planer across the stock, because you're taking fewer cuts per inch. Deep mill marks may also be the result of incorrectly set knives (one knife higher than, or askew to, the other).

So, assuming you have the knives set correctly, the slower you move the planer across the stock, the smoother the cut will be. If you push the tool too slowly, though, you risk burning the wood. The correct feed rate depends on the cutter-head speed of the planer you're using and the type of wood you're planing.

PORTER-CABLE'S SPIRAL EDGE: ONE SMOOTH SHAVER

Porter-Cable's 2⅛" Porta-Plane (model 126) and 3" Versa-Plane (model 663) use spiral cutters, as shown in the photo *at left.* Unlike the straight knives on other planers, these cut with a shearing action rather than a chopping one. The result: a smoother cut.

Spiral knives welded to the cutter head on the 3" Porter-Cable Versa-Plane make an ultra-smooth cut. The knives come in carbide and high-speed tool steel. It also features replaceable stainless-steel shoes for the infeed and outfeed tables.

We found that these tools made exceptionally smooth cuts in woods that have whorled grain patterns, with little or no blowout (tearing chunks out of the surface). On some woods, they actually produce fine shavings, like a hand plane, rather than the chips produced by a typical power planer.

But the knives are welded to the cutter head, so you have to replace the entire head when the knives wear beyond their ability to be sharpened. And the heads aren't cheap: $80 for the 3" carbide cutter on the Versa-Plane, compared to $8 to $20 for carbide knives for other planers.

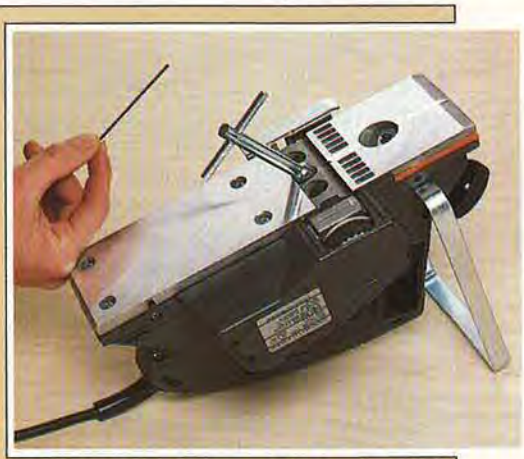
KNIVES: WE LIKE THE DISPOSABLES

Except for the two Porter-Cable units just mentioned, all planers use one of two knife systems: standard single- or double-edge knives that you remove and resharpen, or double-edge disposable knives (see photo *at right*). Standard knives measure ¾" to 1" wide by about ⅛" thick; disposable knives, about 7/32" wide by 1/16" thick.

The thin, disposable knives aren't as fragile as they look. A groove cut across their length locks them firmly into the cutter head. This helps eliminate vibration that could break them.

Both knife types come in high-speed steel or carbide. The chart on page 75 shows which type each manufacturer offers. Carbide knives keep their edge longer, but they're harder to resharpen. Also, because they're more brittle, they may shatter if you misuse the tool.

If you're equipped to sharpen your own knives, you may find standard steel knives less expensive in the long run. But we found the double-edge disposable knives quite convenient. Even in carbide, they cost less than $10, or about the same as two sharpenings.



Like many new planers on the market, the Black & Decker 3370-10 uses thin, disposable blades. A convenient clip-on stand makes blade changing easy.

FENCES AND RABBET FEET: SIMPLE TO FANCY

The fence or edge guide on a hand-held planer enables you to joint a square edge. The longer the fence, the better. Most planers come equipped with a nonbeveling, adjustable fence about ⅓ as long as the base, or shorter. We much prefer having a ½- to full-length fence.

Some planers include standard or optional fences that adjust for making bevel cuts (see photo *at right).* On the (Bosch 3258 and Porter-Cable 126 Porta-Plane) the bevel fences have calibrated markings.

If you want a planer that will cut precise rabbets, look for one with an adjustable shoe or foot to set the rabbet depth. A retractable side guard exposes the right side of the cutter head to allow enough depth to make the rabbet (see photo *at far right*). These tools have maximum rabbet depths of ¾" to 1". The AEG EH82S, Black & Decker 3370-10, Bosch 3258, and Hitachi F-30A have calibrated markings on the feet for depth adjustment. Most of the other planers will cut shallow rabbets (¼" or less) but don't have the rabbet foot or retractable side guard.

POWER MAKES A DIFFERENCE

Hand-held planers range in power from 2.8 to 11 amps. (Because of their size, most small power tools are rated in amps rather than horsepower.) As mentioned earlier, when comparing tools with the same cutting width, the more powerful ones usually take a deeper cut.

They'll also cut faster. The most powerful tool we looked at — the 6 5/8", 11-amp Hitachi — takes a full width, 3/32"-deep cut in oak with barely a change in motor speed.

Also, the more powerful the motor, the better and smoother the tool operates, and the longer it should last. This depends not so much on motor amperage, but on the fact that tools with more powerful motors, usually have more sophisticated designs. As a rule, the manufacturers use higher-quality motor components — bearings, armature, windings, brushes, and housing — in their more powerful hand tools.

In short, don't expect a low-end consumer tool to do as much work or withstand as much abuse as a high-end professional model. But don't discount the useful life of these tools, either. Even a lightweight, inexpensive unit should last many years in the hands of most home woodworkers.

HOW DESIGN AFFECTS CUTTING STYLE

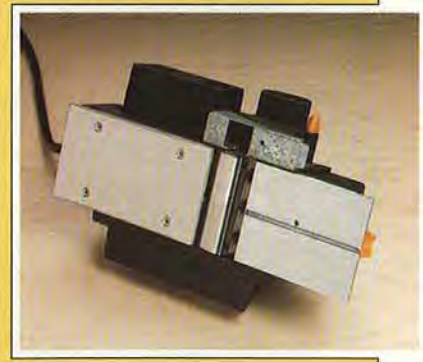
The European and smaller Japanese planers work well for one-handed operation. With their handle centered high on the body, these tools balance when you pick them up. Most also have front handles for two-handed operation. The handle positions on the heavier planers, (and the Sears models), require two-handed operation (see photo *below left*).

We found the one-handed design comfortable and convenient for short-term use, particularly on the smaller, lightweight units. The two-handed design gives you better control for guiding the tool, especially if you use it over an extended period of time.

Overall length and the relative lengths of the infeed and outfeed tables also affect cutting style. The longer the combined length of infeed and outfeed tables, the more accurately you can true a piece of stock.

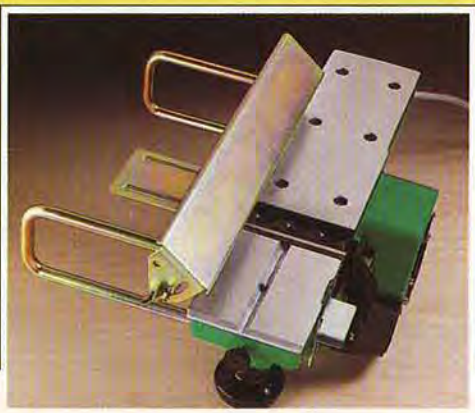
You may find planers with short infeed tables hard to get used to. Very little of the tool rests on the stock so when you start a cut, the back tends to dip down and gouge the wood.

Some planers, such as the AEG EH82S, Bosch 3258, Metabo 0882, and Skil 1570 have an infeed table almost as long as the outfeed (see photo *below right*). This design gives better control when starting the cut. However, with the weight balanced closer to the center of the cutter head, these tools tend to dip into the stock when the infeed table leaves the surface as you finish the cut. Still, those with long infeed tables gave us better control.



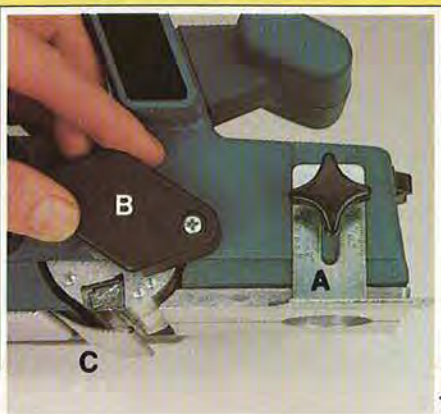
Left: **The center-balanced handle design of the Hitachi F-20A *at left*, is typical of planers designed for one-handed operation. You can also use it with both hands. The handle on the larger F-30A at right, requires both hands for operation.**

Right: **Planers with relatively long infeed tables, such as the AEG EH82S shown here, give you better control when starting a cut.**



Left: **The longer the fence, the more accurately a power planer will joint edges. We like the extra-long fence on the Hitachi F-30A, which also tilts for bevel cuts.**

Right: **Rabbet foot on the Bosch 3258 has a depth scale (A) that reads in millimeters and fractions. A retractable side guard (B) lets you cut rabbets up to 1" deep. Blade guard (C) protects knives when you set down the planer.**



Continued

GOOD-BYE, MR. CHIPS

When cutting, many hand planers shoot the chips several feet out a side port on the right side of the tool. This arrangement works well in most situations because the chips shoot away from you and clear the work area. However, if you're planing horizontally left to right (to accommodate grain pattern), or holding the planer sideways, planing right to left, the planer throws the chips at *you.*

To solve this problem, some manufacturers offer optional chip bags or vacuum attachments for their tools. We found chip bags somewhat bulky, and they fill up quickly. A few planers come with a deflector shield to direct the chips down toward the planed surface (Sears 1732, Porter-Cable 126, and Skil 1550). Still others have a reversible chip exhaust for throwing chips either to the right or left (Black & Decker 3370-10, Porter-Cable 653, Metabo 0882, and Skil 1570). See photo *below.*

Metabo's chip chute baffle directs chips either left to right. The depth-control knob has a scale and click stops for accurate settings.

LOOK FOR THESE CONVENIENCES

Depth-Control Knobs: On most planers, the knob that controls the depth of cut also serves as the front hand grip (the Porter-Cable models use levers). Such controls have no mechanical lock to hold the depth setting, but you don't have to worry about accidentally moving the knob while using the tool. The control holds its setting by means of friction. That's why you may find the knob hard to turn.

The knobs on most models have fine-thread adjustments that require more than one full turn to go from 0 to maximum depth. On a few, such as the Metabo 0882, the knobs adjust their full range in less than one turn. We found these controls much easier to set, especially those with calibrated depth scales. The Metabo features a depth scale with click stops for quick, accurate settings.

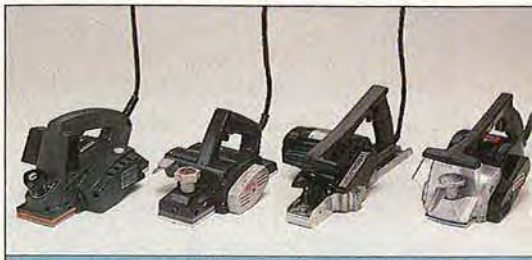
Extra Protection For Knives: The Metabo 0882 and Skil 1570 have a handy built-in foot at the rear of the outfeed table. It flips up when planing, then snaps back into place when you set the tool on your bench. See photo *at right.* The foot elevates the bed just enough to keep the spinning knives from hitting the bench top when you set down the tool.

Bosch incorporates a retractable cutter-head guard on their tool (see photo on page 73). The guard swings back when you start planing, or you can retract it manually.

A flip-down foot on the Metabo 0882 keeps the spinning knives from hitting your bench when you set down the tool. A holder on the cord keeps the tool's Allen wrench handy for changing knives.

WE TRIED OUT THESE TOOLS

3¼" Black & Decker model 7696	3¼" Makita model M101	3⅝" Sears cat. no. 17371	3¼" Skil model 1535



3¼" Black & Decker model 3370-10	3¼" Skil model 1550	2⅛" Wen model 931	3⅝" Sears cat. no. 1732

3⅝" Ryobi model L-150K	3¼" Ryobi model L-1323ALS	3¼" Makita model 1900BW	3¼" Hitachi model F-20A

3⅝" Hitachi model F-30A	3¼" Bosch model 3258	3¼" Metabo model 0882	3¼" AEG model EH82S

6⅝" Hitachi model P50	3" Porter-Cable Versa-Plane model 653	2¼" Porter-Cable Porta-Plane model 126

FACTS AND FIGURES FOR HAND-HELD POWER PLANERS

MANUFACTURER	MODEL NUMBER	CAPACITY			POWER TRAIN			CONSTRUCTION				KNIVES		FENCE		ACCESSORIES[9]			
		CUTTING WIDTH (IN)	CUTTING DEPTH (IN)	RABBET DEPTH[1] (IN)	MOTOR AMPS	BELT & PULLEY TYPE[2]	NO-LOAD (RPM) CUTTER HEAD SPEED	TOOL HOUSING	INFEED TABLE[5]	OUTFEED TABLE[5]	OVERALL LENGTH	TYPE	MATERIAL[7]	ADJUSTABLE ACROSS CUTTER HEAD (Y,N)	BEVEL (Y,N)[8]	STANDARD	OPTIONAL	WEIGHT (LBS)	SUGGESTED[10] LIST PRICE
AEG	EH82S	3¼	3/32	⅞	7.7	C	12,000	G	C	C	11	D	C	Y	N	F,C	A,B,D G,H,	7.5	223.00
Black & Decker	7696	3¼	1/48	5/16	2.8	C	19,000	—	—	SS	10 5/16	D	C	N	N	—	A,B,F	5	79.95
Black & Decker	3370-10	3¼	1/16	1	5.2	C	16,000	—	—	—	11⅝	D	C	Y	Y	F,J	B,G	6.75	177.00
Bosch	3258	3¼	5/64	¾	5.7	C	13,000	G	C	SS	11¼	D	C	Y	Y	C,F,G	A,B,D,H	6.6	175.00
Freud	CE 82	3¼	⅛	1	6.4	C	10,000	G	CA	CA	11¼	D	C	Y	Y	F,H,J	C,E,G	6.38	207.00
Hitachi	F-20A	3¼	1/32	¼	3.4	G	14,500	P	CA	CA	11 1/16	S	S	Y	N	I,J	C,H	5.5	153.00
Hitachi	F-30A	3⅜	⅛	1	8.3	G	12,000	P	CA	CA	15⅜	S	S	Y	Y	G,H,I,J	C	8.8	312.00
Hitachi	P50	6⅝	3/32	⅛	11	G	14,000	P/CA	CA	CA	20 15/32	S	S	N	Y	F,G,H,I,J		19.9	466.00
Makita	M101	3¼	1/32	11/32	4	G	16,000	P	CA	CA	11⅝	S	S	Y	N	F,H,I,J	A,C,G,H	5.5	155.00
Makita	1900BW	3¼	1/32	11/32	4	G	15,000	P	CA	CA	11½	S	S	Y	N	F,H,I,J	A,C,G	5.5	198.00
Makita	1100	3¼	⅛	¾	6.8	G	16,000	P	CA	CA	16⅜	S	S	Y	N	F,H,I,J	C,G	10.8	328.00
Makita	1805B	6⅛	1/16	N	10.5	G	15,000	P	CA	CA	20¾	S	S	Y	Y	F,G,H,I,J	C	17.6	498.00
Metabo	4382	3¼	1/16	⅞	6	G	12,000	CA	CA	CA	13	D	C	Y	Y	F,G	C	13	209.00
Metabo	0882	3¼	⅛	⅞	6	G	12,000	G	CA	CA	11½	D	C	Y	Y	F	C,G	9	199.00
Porter Cable	653	3	⅛	N	10	C	16,000	CA	SS	SS	18	SP	C	Y	Y	F,G	C,H	15	399.00
Porter Cable	126	2 13/32	3/32	N	7	C	22,000	CA	SS	SS	16	SP	S	N	Y	F,G,H	C,H	9.25	265.00
Ryobi	L-1200	3⅝	3/64	¼	3.7	G	15,000	P/CA	CA	CA	10	S	S	N	Y	F,G,I,J	C,H	7.3	160.00
Ryobi	L-150K	3⅝	3/64	¼	3.7	G	15,000	P/CA	CA	CA	11½	S	S	N	Y	F,G,H,I,J	C,E	7.5	213.00
Ryobi	L-1323ALS	3¼	⅛	15/16	8.2	G	14,000	P/CA	CA	CA	14⅝	S	S	Y	Y	F,I,J	C,E,G,H	7.0	229.00
Ryobi	L-22LK	3	⅛	25/32	6.7	G	16,500	P/CA	CA	CA	15	S	S	N	Y	F,G,H,I,J	C	9.7	279.00
Ryobi	L-580A	6⅛	⅛	⅜	10.5	G	16,000	CA	CA	CA	17 5/16	S	S	Y	N	I,J	F	17.4	480.00
Sears	17371	3½	1/50	¼	2.8	C	19,000	T	CA	FS	10⅜	S	S	N	N	—	F	5.5	54.99
Sears	1732	3⅝	1/16	15/64	4.5	C	15,000	I	CA	CA	9⅝	S	S	N	Y	F,J	—	9.8	119.99
Skil	1535	3¼	1/64	9/16	3	G	20,000	G-F P	CA	FS	10⅜	D	S	Y	Y	—	F,G	4	61.99
Skil	1550	3¼	1/16	¼	3.6	G	15,000	G-F P	CA	CA	11¼	D	S	Y	Y	—	C,F,G	5.5	147.00
Skil	1570	3	3/32	¾	10	C	12,500	G-F G	CA	CA	12⅝	S	C	Y	Y	F,G	C,H	9.5	278.00
Wen	931	2⅛	1/16	N	4	C	14,500	T	CA	CA	16	S	S	N	Y	F,G	—	5.5	79.95

1. (N) indicates no rabbeting capacity
2. Manufacturers amperage rating at 110 to 120 volts
3. (C) cog (G) grooved
4. (T) thermoplastic (P) polycarbonates (G) glass = reinforced nylon/plastic (CA) cast aluminum
5. (CA) cast aluminum (SS) stainless steel (FS) Formed Steel
6. (D) disposable steel types can be resharpened (S) standard (SP) spiral see page 72.
7. (C) carbide (S) high speed tool steel
8. Beveling fence either standard or optional accessory
9. (A) Chip bag (B) vacuum attachment (C) replacement carbide blades (D) Rough-texturing blades (D) planer stand (jointer bench) (F) fence or edge guide (G) bevel fence/guide (H) carrying case (I) sharpening guide (J) knife-setting guide (not needed on some models)
10. Many planers discounted 10-30% below manufacturer's list price

MANUFACTURER'S LISTING

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Norwich, CT 06360
(800) 243-0870

Black & Decker Inc.
Call (800) 235-2000 for nearest dealer

Robert Bosch Power Tool Corp.
P.O. Box 2217
Highway 55 West
New Bern, NC 28561
(800) 334-4151

Freud
218 Feld Ave.
P.O. Box 7187
High Point, NC
(800) 334-4107

Hitachi Power Tools U.S.A. Ltd.
4487-F Park Dr.
Norcross, GA 30093
(404) 975-1774

Makita U.S.A. Inc.
12950 Alondra Blvd.
Cerritos, CA 90701
(213) 926-8775

Metabo Corporation
1231 Wilson Dr.
P.O. Box 2287
West Chester, PA 19380
(215) 436-5900

Porter-Cable Corp.
P.O. Box 2468
Jackson, TN 38302
Att'n: Tom Shine

Ryobi America Corp.
1158 Tower Lane
Bensenville, IL 60106
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Sears, Roebuck & Co.
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Skil Corporation
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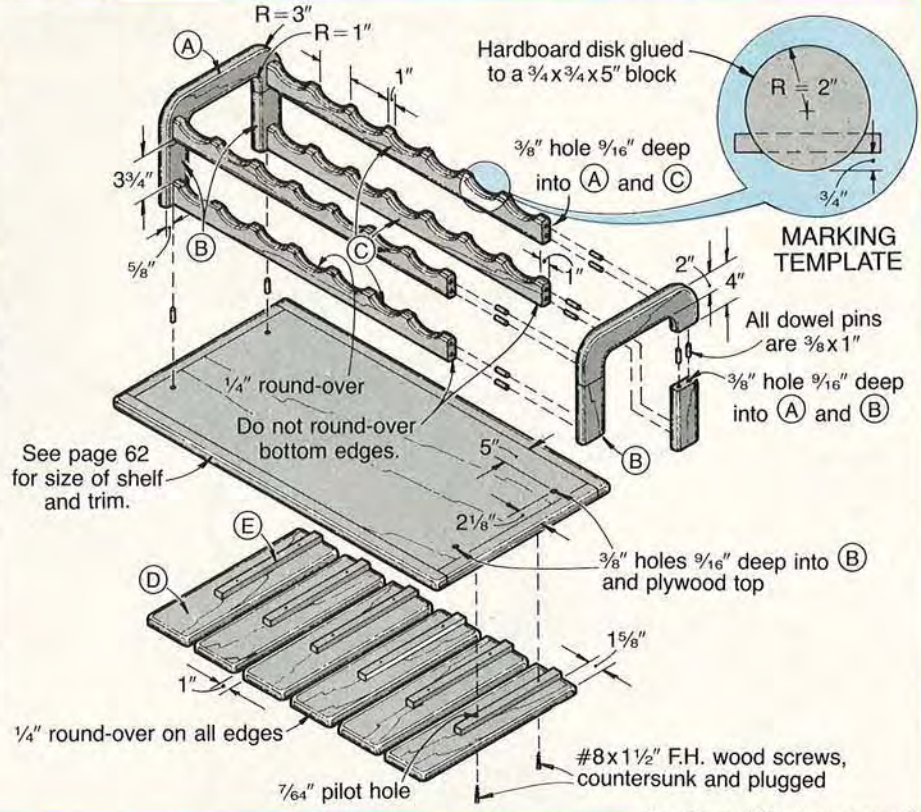

Bill of Materials

Part	Finished Size T	W	L	Material	Qty.
A	¾"	4"	10"	oak	2
B	¾"	2"	5½"	oak	4
C	¾"	2"	29"	oak	4
D	¾"	4"	16"	oak	6
E	½"	¾"	10½"	oak	6

Supplies: #8x1½" flathead wood screws, ⅜" dowel stock, stain, finish

Project Design: Marlen Kemmet
Photograph: Bob Calmer
Illustration: Randall Foshee; Kim Downing

See Record Rack on page 79

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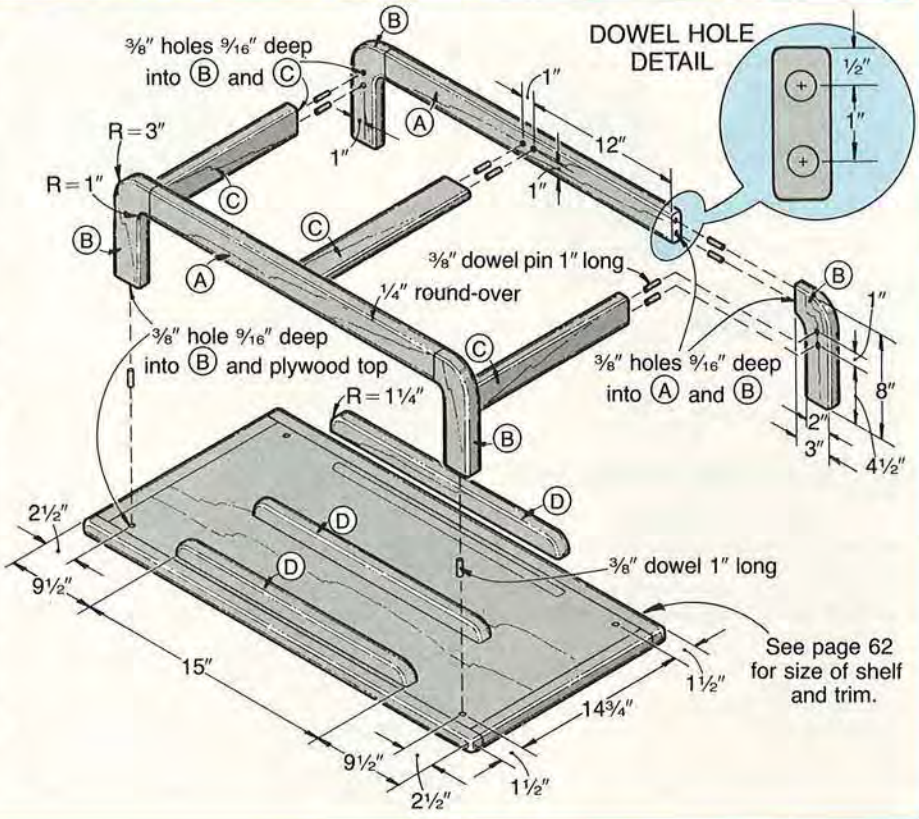

Bill of Materials					
Part	Finished Size			Material	Qty.
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A	¾"	2"	25"	oak	2
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Photograph: Bob Calmer
Illustration: Randall Foshee; Kim Downing

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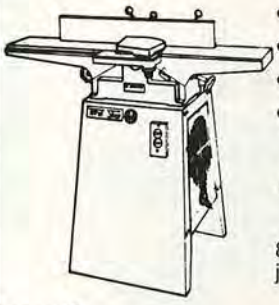

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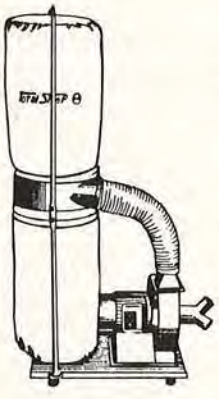

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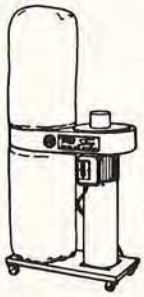

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Here at *WOOD*, we're always looking for products that make life in the woodshop a bit easier, or make a project a bit nicer. When you find a product that really works for you, you tell your friends, right? That's the purpose of this column. We don't always feature the newest products on the market, but ones we think you, as a woodworker, will be interested in. And we test all of them to make sure they meet *our* standards of performance: we hope they'll meet your requirements, too.

DOUBLE-BARRELED DOWELING JIG

The Dowel Crafter jig takes the headaches out of trying to align the dowel holes when joining two pieces of wood. With this self-aligning jig, you can easily drill precisely matched holes for twin doweling in stock measuring from ⅜" to 2¾" thick.

Unlike other doweling jigs, this one doesn't require exact positioning of the guide bushings to ensure perfect dowel-pin alignment. The Dowel Crafter even enables you to make matching off-center holes with mirror-image accuracy. You use just one scribe mark on each board to align them in the jig — no other measuring or laying out is necessary.

The Dowel Crafter quickly and easily joins boards of different thicknesses, keeping one face flush. It enables you to dowel boards edge to edge and end to end, but cannot join the end or edge of one board to the face of another one.

The jig's extra-deep, hardened-steel bushings offer plenty of guidance for drilling ¼", 5/16", ⅜", and ½" holes. Screw clamps keep each board securely locked in position.

The jig includes hardware for clamping it in a bench vise to free both hands for drilling the dowel holes (see photo above). Optional bushings are available for drilling ⅝", ¾", and 1" holes. *Dowel Crafter by The Dowel Craft Company. Available nationwide at hardware stores and through mail-order catalogs for about $45.*

CRÈME DE LA CRÈME WAX

You'll probably find pronouncing the product name harder than applying this soft, buttery furniture wax. Beauté (pronounced bo-TAY) spreads easily with a soft cloth.

This all-natural (100% mineral spirits) wax contains no synthetic substances, such as paraffin or silicone, which can have an adverse effect on some wood finishes. Within minutes of application you can polish to a hard, satiny finish. Wait 24 hours between successive coats to build luster and protect from water and alcohol.

You can use this wax for more than just polishing your furniture. The creamy consistency allows easy mixing with oil pigments for staining and finishing bare wood in one step.

Beauté Satin Creme Wax by Reed Wax, $14.95 for 1-lb. can from Albert Constantine and Son, Inc., 2050 Eastchester Rd., Bronx, NY 10461 (catalog no. W636).

MIGHTY HANDY MODULARS

The modular tool concept — one power pack for a variety of interchangeable work heads — isn't new. But these new tools introduced from West Germany now make this idea a lot more practical. Unlike most of the earlier systems, the tools clip to the power pack in just a few seconds, without need of any special wrenches or other tools.

Overall, we found the tools performed as well as conventional power tools of the same size. The 1-hp motor gives these tools enough guts for heavy-duty work. However, several of the tool attachments may take some getting used to, due to the switch location (on the power pack). *Kress Workforce; sander, drill, and jigsaw plus power head $125; circular saw $50; angle grinder $40. Available nationwide at home centers and department stores.*

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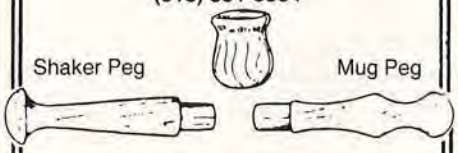

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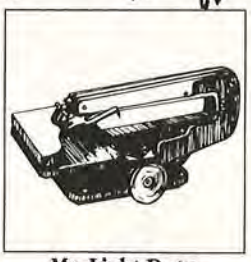

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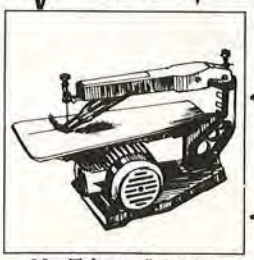

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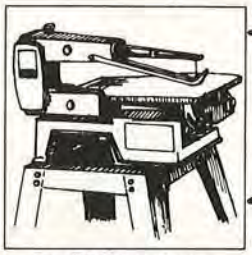

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SOUND ADVICE

Print this article

The in's and out's of wood movement

We tend to take the modern kiln-dried hardwoods for granted. After all, they give us few problems. But before 16th-century woodworkers learned to cope with wood movement through design and construction, wood was actually constrained by binding it with heavy, wrought-iron straps!

Today's woods, once dried to a moisture content of about eight percent, remain quite stable in our modern temperature- and humidity-controlled homes. Yet, as conditions change, wood will still move. If you understand how it does, you can avoid loosened joints, cracks, and cups in your wood projects.

Only two of three directions count

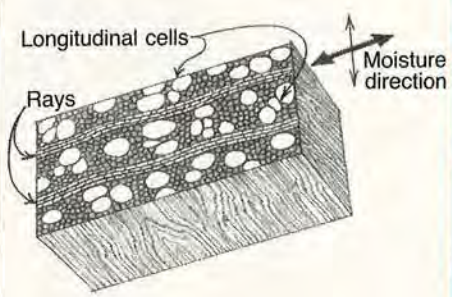
Under a microscope, wood cells look a lot like a fistful of soda straws running from one end of a board to the other. In green wood, both the cell walls and the cell cavities contain moisture. As wood dries, the moisture within the cavities leaves first. But, like empty soda straws, the wood cells remain little changed.

It's when the saturated cell walls start to dry out and shrink that drastic things happen. When the cell walls start losing moisture they contract and shrivel. When wood absorbs moisture again, it only swells when the *cell walls* get saturated.

In a green, flat-sawn hardwood board, the wood actually moves in two directions as it dries out. It shrinks *tangentially*, or in width, and *radially*, in thickness. Length won't be effected.

How much a board shrinks in width and thickness varies with the species. However, you can expect about an eight percent change in width and four percent in thickness when changing from green to dry. That same ratio applies when dry wood reabsorbs moisture and swells.

Why the two-to-one ratio? The orientation of other cell-like wood tissues, primarily the rays, blocks the migration of moisture through the board's thickness. Little such blockage occurs for moisture headed out through the width, as illustrated *below.*



Continued on page 84

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SOUND ADVICE

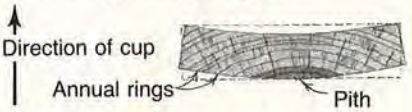
wood movement

Continued from page 83

Planning for wood movement

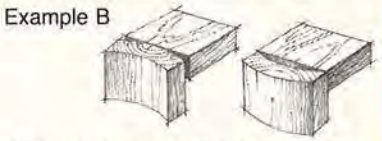
Avoid problems by using wood dried to a moisture content of seven to nine percent. From there, cope with wood movement in your project design. For instance, use frame and panel construction on cabinet sides and doors. The panels float freely inside the frame, allowing for movement. Also leave enough clearance in drawer openings for drawers to slide in and out smoothly even if the wood should swell. And when you design a cabinet or any box-like project, with solid wood on top, bottom, and sides, run all grain in the same direction so the boards will move uniformly and not separate.

Watch how you use boards with clearly visible annual growth rings, too. Those little semicircles you see in the end grain of flat-sawn wood can tip you off as to which way the board might cup. The center of the circular pattern, shown *below*, represents the pith of the tree, and a board cups away from the pith.



To eliminate cupping, use boards with annual rings nearly perpendicular to the surface, as in example A, *below*. Or, if you must

Using only wood with nearly perpendicular annual rings avoids cupping.



Plan joinery so any cupping won't separate the joint.

join boards with visible rings, plan for cupping against the joint, not away from it, as in example B.

Illustrations: Jim Stevenson

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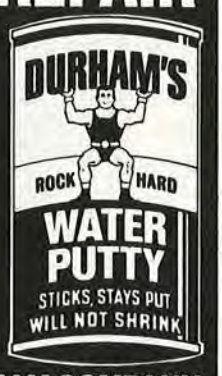

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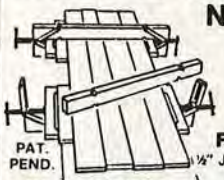

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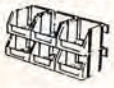

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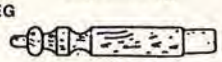

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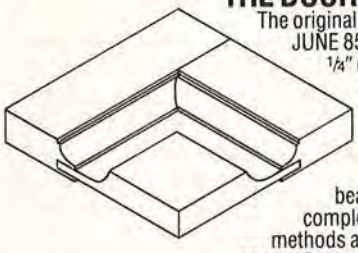

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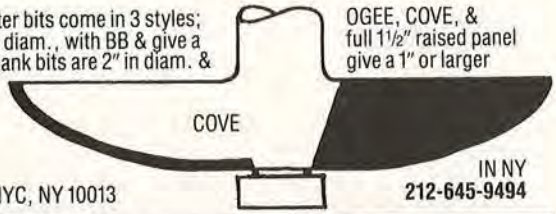

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With help from high-tech machinery, today's veneer manufacturers make the most out of ever-more-expensive veneer logs by slicing them onion-skin thin. That's great for them! But when you repair a "veteran" veneered surface — typically 1/16" thick — you somehow have to bridge the thickness gap between it and the new, thinner material.

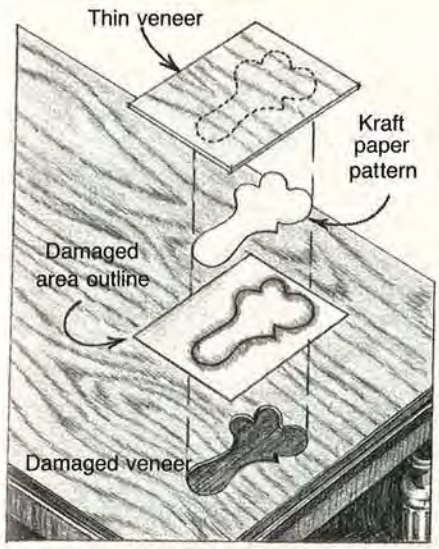
At *WOOD,* we use a backing of heavy-duty kraft paper (grocery sacks work fine). Glued to the back of thin veneer, it forms a tough support for an otherwise fragile patch. Usually, you'll have to shim up the 1/128"-thick material in order for the patch to match at the proper level.

Follow these steps for a real pro repair:

Print this article

1 Clean out the damaged area by cutting away the old veneer with a sharp craft, utility, or trimming knife. Make an irregular outline for the patch area if you can. It'll be less noticeable than a circular or rectangular area when you're finished. Be sure to scrape away any old glue and splinters left from the veteran veneer.

2 Cut a piece of kraft paper larger than you need for the patch. Place this paper over the patch area, hold it firmly in place,



and rub around the patch outline with a soft lead pencil. To form a pattern for the patch, trim the paper carefully along the pencil line. Now test fit it.

3 Select a piece of new veneer that matches as closely as possible the grain and coloring of the original veneer. Next, adhere your kraft paper pattern to the back of the new veneer with contact cement. Watch out so you don't flop the pattern in the process — the *top* of the pattern gets attached to the *back* of the veneer! Also remember to arrange the veneer on the pattern so the grain direction matches that of the original surface.

4 Trim the veneer to match your pattern outline, then fit it into the damaged area. You may have to do some additional trimming for an exact fit.

5 Dry-fit the patch to see if it sits slightly above the surface to allow for some sanding. If it doesn't, add more layers of kraft paper to shim it up.

6 Glue the patch in with contact cement, firmly rolling or pressing it down. When dry, you can sand and complete the finishing of the patched area.

Illustration: C. L. Gatzke

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SOURCES AND RESOURCES FOR THE TOOL COLLECTOR

See related article, page 50

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Books for suggested reading:

Antique Woodworking Tools, by Michael Dunbar, $12.95, Hastings House, New York, 1977.

Dictionary of Tools, by Henry Salaman, Charles Scribner's Sons, New York (out of print).

The Antique Tool Collector's Guide to Value, by Ronald S. Barlow, $12.95, Windmill Publishing Co., El Cajon, Calif., 1985.

Periodicals:

The Fine Tool Journal, Bi-monthly, published by Iron Horse Antiques, Inc., RD No. 2, Poultney, VT 05764, One year, $15.

Tool Ads, monthly, P.O. Box 33, Hamilton, MT 59840, One year $15 (third class mail).
Also see club listings for newsletters.

Collectible Tool Auctioneers and Dealers:

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Whitby, Phillip. 2722 W. Union Ave., Englewood, CO 80110.

Witte, Tom. P.O. Box 399, Front Street West, Mattawan, MI 49071.

Studying up on tools helps you find real flea market buys.

Tool collectors clubs and associations:

Early American Industries Association (EAIA), Harvey F. Jaecock, Pres., 29 Creamery Lane, Ridgefield, CT 06877; $15 annual membership includes quarterly magazine. EAIA-West, Roger Phillips, Pres., 8476 West Way Dr., La Jolla, CA 92038; same dues.

Mid-West Tool Collectors Assoc., Tom Ward, Pres., P.O. Box 11, Avondale Estates, GA 30002; $15 annual membership includes monthly newsletter.

Southwest Tool Collectors, Troy Marshall, Sec., 27126 Glencreek, Huffman, TX 77336; $12 annual membership includes monthly newsletter.

Pacific Northwest Tool Collectors, Rich Corbat, Pres., 310 W. Grant, Lebanon, OR 97355; $12 annual membership includes quarterly newsletter.

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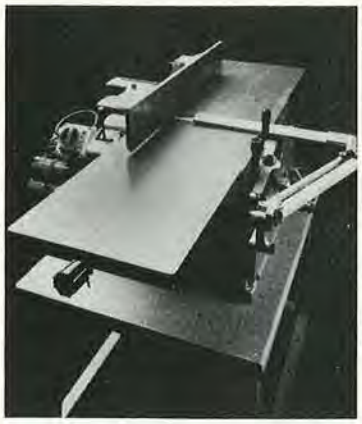

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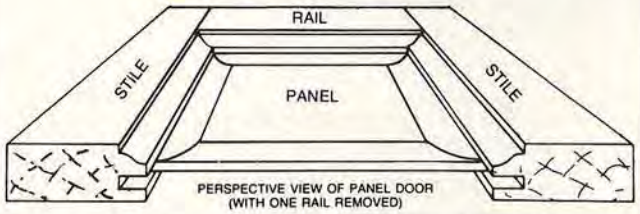

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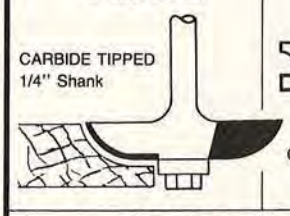

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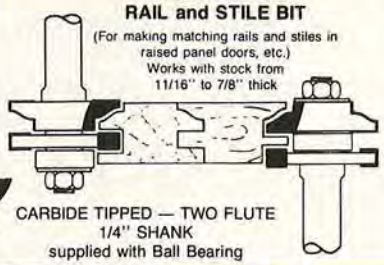

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A word of caution: Do not permanently attach a collection box to any power tool; you may need to remove the box to adjust or repair the equipment later.

Photographs: Jim Kascoutas

Tapered collector on table saw

Router-table guard with vacuum adapter

Drum-sander hood with adapter

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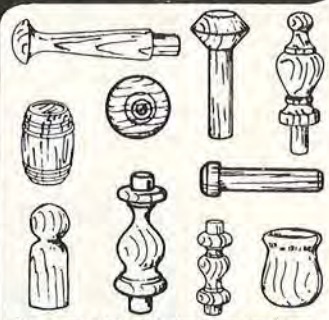

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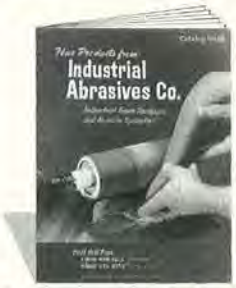

4. Buy your sanding belts direct from the manufacturer and save! Yes, Industrial Abrasives is the company that gives you six free belts with every dozen ordered. *But,* sanding belts are not the only product we have to offer. In our catalog you will find many sanding-related items not readily available in your hardware store. $1.00 (refundable with order).

8. The Japan Woodworker's 1987 Catalog is loaded with the best tools you can get your hands on. In our catalog are tools for the woodcarver, carpenter and cabinetmaker. Send $1.50 for our 1987 catalog and supplements during the next two years.

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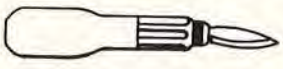

22. Warren Tool Company's Woodcarver's Catalog features the finest quality whittling and carving hand and power tools, books, sharpening stones, wood and supplies. Warren Tool has become a common name in the wood carving world because we take pride in selling only the finest professional tools. Remember our motto: "Warren Tools give you the edge." Send $1.00 for catalog #5.

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30. Big full-color catalogs packed with exciting products. Tools, air compressors, generators, binoculars, stereos, housewares and appliances. Easy ordering by phone or mail. $1.00.

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32. Toy Designs' catalog of wooden toy patterns, hardwood turnings, complete kits; also patterns plus turnings kits and woodworking books. Choose from seven full-sized patterns $5 each; order four or more patterns for only $4 each. Package of eight spoked wheels $5.95. Catalog free with order. Catalog alone $1.50.

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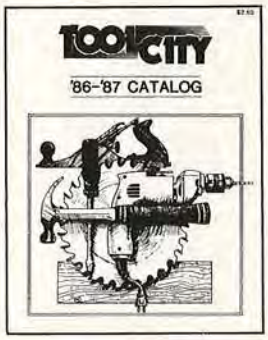

36. Tool City catalog is 408 pages; the most complete mail-order tool catalog. Priced to save you money in all categories. All types of power and hand tools at discount prices. $2.50.

37. Executive wood toys! If you want more in the line of wood toys, let Toys and Joys offer you a line of detailed patterns for classic cars, trucks, trains, etc. We also carry a complete line of wood toy parts. Ask about our deluxe spoke wheels. Catalog $1.00.

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38. Over 200 router bits and shape cutters displayed in catalog featuring six-piece cabinet sets, three-piece ½" shank router bit panel raising system and three-wing industrial shaper cutters. Shaper cutters available in ½" through 1¼" bore with bushings. Router bits offered in ¼" and ½" shank. Catalog $1.00.

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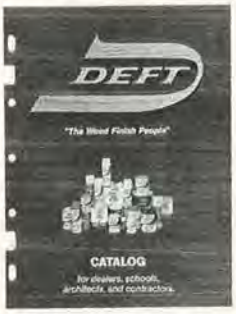

44. Deft Inc.'s 18-page, four-color catalog gives plenty of helpful tips for better results in wood staining and finishing. Included are Deft products which finish interior wood easily: polyurethane finish, Danish oil finish, a non-yellowing, crystal clear, durable acrylic coating, oil base stains and spray stains. $1.00.

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48. Workshop Blueprint's project plans are professionally designed. Include furniture, playthings and accessories; also more complex projects such as storage sheds and gazebos. Plans use readily available materials, keeping in mind standard sizes of lumber. Instructions are clear and concise, and occasionally include tips that will make your job easier. Some plans have a cut-out materials list to take with you to the lumber yard. Catalog $2.00 (refundable with order).

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53. For a limited time Foley-Belsaw will be giving away one-year free subscriptions to the Foley-Belsaw catalog in a "news bulletin" format. This full-color publication includes stories and shop tips on all types of woodworking, tool sharpening, small engine repair, locksmithing and upholstery. Also includes many special offers on Foley-Belsaw equipment.

Furniture Designs, Inc.

57. Wonderland for woodworkers! Illustrations and descriptions of over 180 full-size plans of fine, museum-quality furniture. Includes cradles, roll-top desk, tables, chairs, buffets, chests, gun cabinets, poker table, children's furniture, rocking horse, spinning wheels and more. Catalog $2.00—refundable with first plan order.

50. The 1987 Tools on Sale Catalog (a division of Seven Corners Ace Hdwe.) features over 350 pages of the most competitive prices in the industry. This catalog offers one of the most complete selections of power tools and accessories available anywhere from the most respected manufacturers in the industry: Milwaukee, Makita, Porter-Cable, Black & Decker, Freud, Bosch, Delta and many more. $1.00.

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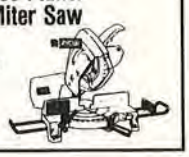

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GENERAL HARDWARE—has manufactured quality hand tools at an outstanding value for over half a century. General's newest catalog features our popular chisel and plane sharpeners, doweling jigs, circle cutters, marking tools, gauges, T-bevels, countersink sets, drill guides and accessories, carving sets, and precision hobby knives. Also a full line of precision measuring and hobby tools available. Catalog $1.50, plus $1.50 postage. GENERAL HARDWARE. $3.00. *Circle No. 858.*

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THE 1987 HILLER HARDWARE CATALOG—is a comprehensive collection of tools & accessories for you. Select from the best quality tools in the business at a price only a volume supplier can provide. Power tools, hand tools, cutters, blades, & accessories. 24 pages, over 240 tools! HILLER HARDWARE. $1.00. *Circle No. 875.*

WOODWORKING TOOLS, MACHINERY, & SUPPLIES—W. S. Jenks & Son's new 128 page source book is packed with a full range of tools for the serious woodworker, from hand tools, to portable power tools, to woodworking machinery. Includes many imported and hard to find tools, from the best manufacturers at the most competitive prices. Send for catalog. W. S. JENKS & SON. $2.00 (refundable with first order). *Circle No. 877.*

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TOOLS ON SALE—A division of Seven Corners Ace Hardware Inc. offers a comprehensive catalog featuring over 190 pages of the most competitive prices in the industry. If you're looking for savings and fast delivery on over 1800 items, request our catalog. This catalog offers one of the most complete selections of power tools available anywhere from the most respected manufacturers in the industry: Milwaukee, Makita, Porter-Cable, Black & Decker, Freud, Bosch, Delta, and many more. SEVEN CORNERS ACE HARDWARE. $1.00. *Circle No. 920.*

CABINET MAKERS' TOOLS AND SUPPLIES — New 224-page catalog of fine hand and power tools for cabinet makers or serious woodworkers. Also featured are three sections on hardware, supplies, and cutting tools. This catalog takes the mystery out of using European hardware. A must reference for the woodworker. THE SOURCE. $3.00. *Circle No. 935.*

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OUR WOOD PARTS MAKE IT EASY—for you to make professional looking furniture. We feature legs, arms and turned columns for tables, chairs, etc. in styles including Chippendale and Queen Anne. Our woods include walnut, mahogany, cherry and oak. We also feature a Queen Anne chair, ready to assemble and finish. Send for brochure packet. ADAMS WOOD PRODUCTS. 50¢. *Circle No. 1401.*

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TOYMAKER'S SUPPLY COMPANY—has your best bulk price on quality wooden toy parts and toy plans. Over 50 turnings to make your toys professional looking. Send for catalog. TOYMAKER'S SUPPLY CO. Free. *Circle No. 1475.*

WOOD TOY PATTERNS — Patterns for all ages including childrens' patterns and executive toys. New catalog has many new patterns to choose from including parts and wheels. Send for new catalog and receive a coupon for free wheels and axle pegs. TOYS AND JOYS. $1.00. *Circle No. 1480.*

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START SMALL BUSINESS WITH NEW SCROLL SAW — The Excalibur precision scroll saw from Canada can turn your workshop into a profit center. Make toys and puzzles, do intricate marquetry work or detailed cabinet work with these "operator friendly" machines. Hundreds sold in the U.S. already. Save, buy direct, from $495. up. Complete project patterns and plans available. Send for brochure. J. PHILIP HUMFREY INT. $1.00. *Circle No. 1655.*

FURNITURE RESTORATION—Earn $200-$1000 per day stripping, repairing, refinishing, mirror resilvering, and/or veneering, at home or in shop, spare time or full time. Complete training. No experience necessary. Attend free furniture restoration seminar. Send for catalog. MINUTEMAN. $1.00. *Circle no. 1661.*

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MAKE WOODEN TOYS — Whirligigs, doll houses, swing sets, classic autos, furniture and crafts with our plans, kits, parts, and supplies. For all skill levels. Also parts (toy, craft, game, and furniture) and dimensional lumber in maple, oak, walnut, and cherry along with specialty brass parts, tools, books, organizers and finishes. Send for color catalog subscription. CHERRY TREE TOYS, INC. $1.00. *Circle No. 1918.*

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THE CUSHION CONTOUR SANDER — is a new concept in pneumatic drum sanding. Sanding sleeves are slid over an air bag (inflated with a hand tire pump) on an arbor to mount it between centers on a wood lathe. Drum effectively takes on profiles, curves, and bevels practically eliminating flat spots and chatter marks. INDUSTRIAL ABRASIVES CO. Free. *Circle No. 1976.*

BANDSAW OWNERS — A new tool is now available so you can make or repair any length bandsaw blade in minutes. Our splicer enables craftsmen to make up any length blade from economical coil blade stock quickly and easily. Three models are currently available to accomodate blade widths from ⅛ to 1½ in. The tool comes complete with detailed instructions and supplies. We also carry OLSON bandsaw stock at reasonable prices. Send for literature. NEW MILFORD SPECIALTIES CO. 50¢. *Circle No. 2025.*

LETTER LAYOUT GUIDES — Brochure containing complete information about a new product of special interest to scroll sawers, carvers, and wood sign makers. A lettering guide to layout large letters and numbers to be cut in wood or other materials. Made from a durable plastic material for years of use. Price of brochure is refundable with first order. SEYCO SALES CO. $1.00. *Circle No. 2057.*

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PERFECT EDGE-JOINING EVERYTIME — "Duo-Clamp" holds your boards flat while applying uniform yet firm pressure to squeeze out excess glue. Bowing totally impossible. The need for a surface planer is eliminated; a light belt sander finishes your job. Patent applied for. Easily assembled and unconditionally guaranteed. Made of sturdy maple. Send for information. MARK PRODUCTS. 25¢. *Circle No. 2255.*

CLOCKS

BUILD A BEAUTIFUL HEIRLOOM CLOCK—From easy-to-assemble clock case kits to plans and hard to find parts for the scratch builder, Murray Clock Craft features the famous URGOS movements and only the finest North American black walnut, mahogany, cherry and white oak. Extensive collection of kits, plans, movements, parts and beveled glass available. MURRAY CLOCK CRAFT LTD. $2.00 (refundable with first order). *Circle No. 2350.*

ANTIQUE TOOLS

THE FINE TOOL JOURNAL — Published 6 times per year, this publication will keep you up to date with the many aspects of the world of antique and obsolete hand tools. Tools are offered for sale, books on tools are reviewed and sold, auctions are reviewed, articles on identification, values, and history. Send for sample copy. IRON HORSE ANTIQUES, INC. $1.50. *Circle No. 2435.*

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The Bulletin Board

WOODWORKING FACTS, FACES, AND FABLES

SORRY, NO TREES. YOU CAN'T BE GREEN

Greenland was so named because of its many trees and forests, and to differentiate it from Iceland, which has practically none.

SCIENTISTS SCORE STRADIVARIUS'S SOUND SECRET

Texas A&M University scientists may have unraveled the mystery behind the time-honored tone of Stradivarius violins. Microscopic inspections of wood taken from these famous instruments and those of other noted Italian luthiers revealed a fungus alive and well in the cellulose cells!

These famous violin makers of the 17th and 18th centuries used wood that they first soaked in water, rather than dry wood, scientists theorize. Fungus in the water changed the shape of the wood's cellular structure. Thus, the violins of that particular period have a special, full-bodied sound.

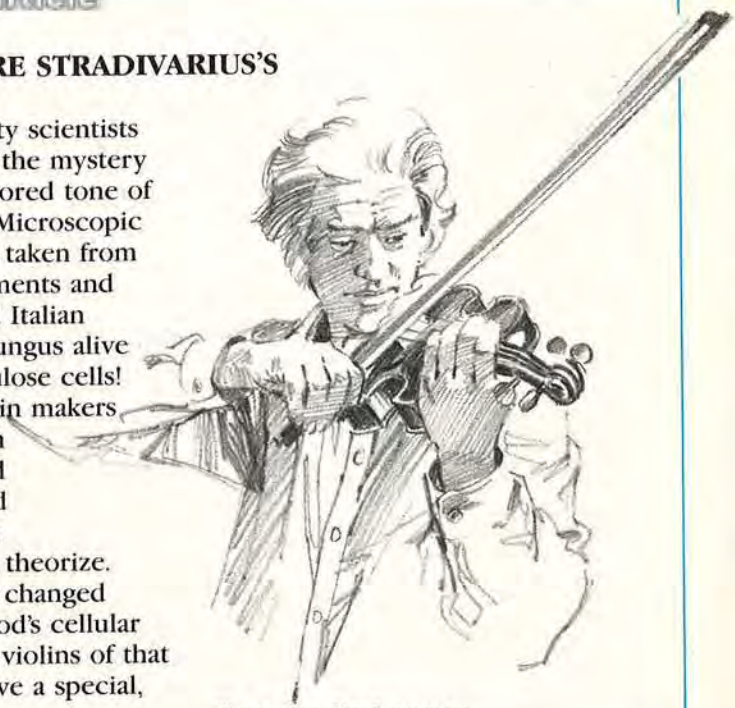

Illustration: Jim Stevenson

WHAT A DIFFERENCE 104 YEARS MAKE!

WAKEFIELD & TROW,

Lumber, Lath & Shingles,

MERRILLAN, WIS.

REDUCED PRICE-LIST,

OCTOBER 1, 1883.

PRICES ON TRACK HERE.

Scantling, Joist and Small Timber, 16 feet and under	$10 00		
For each additional foot	25		
1st Common Boards	$11 00	Beaded Ceiling, No. 1	30 00
2d do do	9 00	do do 2	22 00
Fencing, No. 1	12 00	Wainscoating, No. 1	24 00
do 2	10 00	do 2	22 00
Roof Boards	$6 00 to 8 00	do 3	20 00
Sheeting	7 00	do common	16 00
Culls	$5 00 to 7 00	1 inch Batts, No. 1	24 00
13 inch Box Boards	20 00	do do 2	20 00
Stock Boards, C	18 00	½ do do 1	14 00
do do D	14 00	do do 2	12 00
Ship-Lap, No. 1	16 00	1 inch Selects, No. 2	28 00
do 2	14 00	do do 3	22 00
do 3	12 00	1¼ & 1½ do 1	30 00
½ inch Siding, No. 1	16 00	do do 2	24 00
do do 2	14 00	XX Shingles	2 75
do do 3	12 00	X do	1 75
Drop Siding, No. 1	24 00	No 1 do	75
do do 2	20 00	No. 1 Lath	1 60
do do 3	16 00		
do do 4	14 00		
Flooring, D. and M. No 1	26 00		
do do do 2	20 00		
do do do 3	18 00		
do do do 4	14 00		
do do do 5	12 00		

Surfacing, $1 per M.

Reader R. J. Russell, of Des Moines, Iowa, was kind enough to share with us the lumber price list, *left.* He found it in an antiques store. The postcard, dated October 1883, lists prices for boards and other stock sawn and milled by a Merrillan, Wisconsin, logging and lumber company.

One of the first questions we had to ask was whether or not the company still exists. *Answer:* No! The company apparently moved on when the area's forests were logged out. Remember, this was before the days of regulated harvest.

Second question: What kind of lumber was it selling? *Answer:* White pine. An educated guess, but before the turn of the century the Badger State was covered with white pine from Merrillan, in the north central part, to the shores of Lake Superior.

Third question: How much wood does each price quotation represent? *Answer:* Except where otherwise stated, 1,000 feet! Wholesale prices are always quoted by the thousand, and with pine, in lineal feet rather than the common measure of board feet suppliers use for hardwood.

Fourth question: How do those 1883 prices compare with today's? *Answer:* You won't believe this! Gordon Suchow, of Frank Paxton Lumber Co., gave us some examples. Today, "1st Common Boards" of pine (northern white or ponderosa) cost 64 cents per foot compared to 1.1 cents 104 years ago. Beaded ceiling boards, now undergoing renewed popularity, cost $795 per thousand feet. Back then: $30 per thousand. Of course, those vintage prices didn't include freight.

You also might wonder just what a few of the items listed are. We did some checking with lumber people, and here's what we found out. *Scantling* refers to undersized dimension lumber. *Box boards* mean boards the perfect size for grain wagon boxes. And *batts* are narrow strips used in *board and batten* construction, then popular for barn building. The recurring do simply means "ditto."

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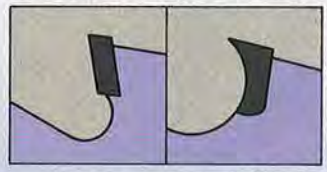

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